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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. L

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No. 13

What the Automotive Map May Look Like in 1930

Exact contours cannot be deciphered but present trends show general characteristics. Merger epidemics unlikely. Parts makers have big problem to solve.

By James Dalton



IF we had some good, reliable crystal gazer who could peer into a glass globe for a couple of hours and then give us an accurate picture of what the automotive industry would look like along in 1930, it would pay those of us who are hungry for that kind of art to make up a pool and hire him. It would clear up a lot of uncertainty and ease many minds.

Unfortunately, the most reliable crystal gazers available to us are economists who base forecasts of the future on the experience of the past and who are quite as likely to be wrong as right to all practical purposes. They know that in the course of human events certain things are almost certain to happen, but they don't know exactly when and that's what counts in business.

THE likelihood of a man's success in any line of endeavor depends largely upon his ability to peer into the future, estimate what's going to happen and make his plans accordingly. No matter how good a guesser he may be, however, he would be foolish, if he is a manufacturer, to lay down definite production schedules for more than a few months ahead. His estimate of the more distant future may be entirely accurate, but he can't have the prophetic vision to foretell exactly just when the things he sees will come to pass.

"What goes up must come down" and trade runs in cycles. We know that depression inevitably fol-

lows inflation, but we have no idea how long the intervals between will be nor how long it will take to reach the peak either of the one or the other. Long-swing calculations, therefore, as expressed in definite terms of years or months, are dangerous.

WISDOM counsels short-term projections when it comes to the formulation of definite policies. This need not mean a degree of caution which will be cowardly, however, for the careful student of economics and business conditions can see far enough ahead to take advantage of favorable price fluctuations and to curtail or expand production as impending conditions may dictate. The cautious business man never permits himself to become so far extended that he can't contract quickly enough to save himself if something wholly unexpected happens. Persons who "take a gambler's chance" sometimes win, but the hazards are all against them.

Cultivation of ability to look into the future is the most profitable pastime a business man can have, however, for as his vision becomes keener he is able to get the jump on his competitor. It may be by cutting down his output so that he will be able to weather a storm or it may be by expanding production so he will have goods to sell if the market broadens sooner than the other fellow expects.

Continued crystal gazing of this character also will have cumulative results. It will enable the seer to estimate pretty accurately what will happen in the long swing. He doesn't know the year or the month

that his expectations will be realized, but he will be planning subconsciously how to take advantage of them and will be ready to grasp opportunities as they arise.

There has been altogether too great a tendency in the automotive industry to take "pot-luck" without adequate consideration of the future. A good many of the men making and selling motor vehicles today can remember clearly the time when "gas buggies" caused derisive smiles. It is small wonder, therefore, that some of them haven't been able to visualize the changes twenty years have brought. They are trying to do business in much the same way they did when it was a game or a speculation. But it can't be done.

Industry Becoming Stable

Fortunately, the industry is so young it has had few traditions, but it cherished those which it did build up and was reluctant to let them go. One of the most venerable was the seasonable fluctuations in sales. But even that has been pretty much shot to pieces in the last couple of years.

We can't quite realize it, but the automotive industry is rapidly becoming stabilized and stabilization brings an entirely new set of problems.

Stabilization does not, of necessity, mean consolidations and closer concentration of production in the passenger car and truck fields. Whatever applies to one branch of the industry is likely to apply to all of them. No one can foretell exactly the conditions which will hold five or six years from now, but certain trends are becoming apparent which give clues to what may happen.

The three major branches of the manufacturing end of the business are:

1. Passenger cars.
2. Commercial vehicles.
3. Parts and accessories.

Up to this time relatively little attention has been given by investors and others to the future of the parts and accessory makers. No one knows exactly how many reputable manufacturers there are, but the number probably approximates 800. It seems to have been taken for granted that there will be many combinations and eliminations and there undoubtedly will be a good many, but the trend in that direction is not so strong as might be expected.

Producers are divided into these classes:

1. Those who make original equipment only.
2. Those who make replacement equipment only.
3. Those who make both.

So far as competition is concerned it is about equally keen in all these fields. There is one very important difference, however. The market for unit parts and original equipment has been contracting slowly, while the market for replacements has expanded amazingly.

Self-Contained Units Increase

Major producers of motor vehicles have been making themselves each year a little more independent of the parts branch of the industry. This has been particularly true of Ford and General Motors, which account for more than 70 per cent of all the vehicles made. Except for tires and comparatively minor parts and accessories, therefore, manufacturers of original equipment are dependent for sales upon makers of less than 30 per cent of the motor vehicles. Generally speaking, the business of their individual customers has increased, but they have been making more and more of their own major parts. The tendency will be to go farther in this direction rather than the reverse.

The outlook for the exclusive original equipment manufacturer, therefore, is not particularly bright unless he

finds some profitable supplemental use for surplus factory space.

On the other hand, manufacturers who have catered to purchasers of both original and replacement equipment have found that as business has fallen off in the one field it has increased in the other so that their profits have been equalized.

With 15,000,000 motor vehicles now in use and the number growing larger every year, it is patent that the market for replacement parts and equipment never can grow any smaller than it is today. Surveys have disclosed that as a rule it is the most profitable branch of the business.

The manufacturer who has confined his operations to original equipment and finds his sales outlets diminishing in number has two courses open to him:

1. To produce some line of replacement parts or accessories which will insure a steady sales demand.
2. To supplement his original automotive equipment with some entirely separate product or products which will sell in some other industry or industries.

Only in one of these two ways can he hold down his manufacturing costs by keeping his plant operating at capacity. This fact is realized by a good many wide-awake parts makers and they are casting about for means to broaden their sales horizon. In the realm of automotive equipment there is almost unlimited opportunity for originality, because improvements and novelties are being developed constantly.

Advantages of Consolidation

The main advantages of industrial consolidations are reduced overhead and lower marketing costs. When two or more companies making the same or similar products find that the market for their goods is likely to expand steadily and that they can increase their sales volume while effecting substantial economies by consolidating, such a step would seem to be dictated by good business judgment.

It might be argued, also, that the same reasoning would apply to a diminishing market and it probably would if the owners of the companies involved were content to see them gradually dry up and disappear. Manufacturers in the parts field are not of that type, however. They are progressive and aggressive. They have become accustomed to keenly competitive conditions and they relish the sharp battle for business. There have been a good many highly successful consolidations in the automotive field, but generally speaking combinations have been negotiated chiefly to avert failure. In some cases this end has been achieved, but in more it hasn't.

The replacement market offers one tremendous advantage over the original equipment. If one customer or a hundred customers are lost it is easy to get one or a hundred more to take their places. In the original equipment field, on the other hand, if one big customer is lost it may be impossible to find another single outlet of equal size. That has been and still is one of the chief menaces in the parts field. There have been countless cases where parts makers have gone on year in and year out selling the major part of their output to one or two big vehicle manufacturers and then found the business suddenly shifted to a competitor or taken over by the customer himself.

Companies which have counted themselves as fortunate in not having to seek new outlets have found themselves faced with the necessity of curtailing operations sharply or making frantic efforts to find new patrons. This not infrequently has resulted in the making of price concessions which have sent profits glimmering. The old adage about the foolhardiness of putting all one's

eggs in a single basket holds true in manufacturing as well as in anything else.

While the opportunities in the replacement market are limitless, it should not be assumed that the original equipment field is bare of them. Even though passenger car companies may add annually to the list of components they make themselves, it will be a long time before they are entirely self-contained, if they ever are. Whatever shrinkage there may be will be gradual.

Good Future for Assemblers

The assemblers never will be wiped off the map and it is quite possible that their output will increase rather than diminish. The total volume of original equipment business will run far into the millions for many years to come. It can be accepted as certain, also, that the profits from this business will never be any smaller. A good many parts makers have been giving car manufacturers prices which brought profits to the vanishing point on the theory that this business would supply a back-log for production and that the concessions given were justifiable because they would lower manufacturing and overhead costs.

Such a theory is not tenable in the long run. Business must be done at a profit, and parts companies, sooner rather than later, will strive to place themselves in a position where they can decline these profitless orders.

Some of the smaller body makers offer examples of putting all the eggs in one basket. The rapid increase in the demand for closed cars made it necessary for vehicle producers to seek new sources of supply. As a consequence they gave body manufacturers orders of sufficient size to keep their plants operating at capacity. There is a surplus of body building capacity, however, and a never ceasing effort is being made to bring down prices, so that if a passenger car factory finds it can get a price concession from another body manufacturer who agrees to turn out goods of equal quality, the contract with the original source of supply will be cancelled.

The remedy seems to be to have a reserve of business on hand, either by the development of a side line or by the assiduous cultivation of potential customers. A company may have done a mighty good job over a term of years for one or two manufacturers but no one else is likely to know much about it unless some definite effort is made to keep its name before the trade consistently and permanently. In other words, it must build good will for itself and its products among possible purchasers.

Problems of the parts and accessory makers have been complicated by the tendency on the part of the largest vehicle producers to make themselves self-contained. Up to this time efforts in this direction have applied only to the parts which actually go into the car and not to accessories. Ford comes nearest to being independent of everyone else and takes the position that his car is complete as it goes to the purchaser. His dealers are not permitted to sell competing parts but there is nothing to prevent an owner from buying them elsewhere if he so desires.

Notwithstanding Ford's large measure of independence, however, there are a great many thriving factories which

derive most of their revenue from the sale of parts and accessories designed especially for his cars. The market per individual owner may be comparatively small but when the owners run into the millions the aggregate is a huge volume of business.

What may happen if the largest producers decide to go into the accessory business themselves is difficult to foretell. None of them has done it on a large scale up to this time. For that reason, if no other, the recent announcement that the Olds Motor Works had arranged to supply its dealers with a line of accessories including bumpers, spotlights, windshield wipers, rear view mirrors, trunks, windshield wings, etc., is peculiarly interesting. If this becomes the policy of all the units in the General Motors line it will affect at least 20 per cent of the total production in the passenger car field.

The degree of aggressiveness with which such a plan was carried out in respect to these popular lines, and the restrictions which might be placed on dealers, would determine the effect upon accessory makers in general. It

undoubtedly is true that when a person buys a car he reposes a certain amount of confidence in the dealer from whom he purchases it and is more than likely to buy accessories and replacement parts from him if he thinks that the prices are fair.

If most of the large automobile producers decide to supply "genuine" accessories for their products it obviously may have a serious effect on the independents. The degree of success attained by makers

of "substitute" rather than "genuine" parts, however, indicates that their plight would not be hopeless unless the car manufacturers were content with a much smaller margin of profits on accessories than has been the case in respect to "genuine" parts, except those for Fords and a very few other lines.

The degree of success which will attend any incursion into this field will be determined almost entirely by the attitude of the dealers. If they accept it without question and give it their support it undoubtedly will be profitable but that is a very large IF. Car makers and car sellers are in business for exactly the same purpose and that is to make money. The interests of the one do not always coincide with the interests of the other.

Dealers Should Sell Accessories

Experience has demonstrated that mighty few dealers can amass riches from the sale of cars alone. Many of them, especially in the smaller towns, where more than half the automobiles made are sold, make more on sales of accessories and replacement parts than they do on the sale of cars. It is quite possible that a large percentage of them will take the position that they can get larger returns from handling a complete line of accessories than by devoting themselves to a line which their factories may be trying to push, and which is suitable only for a particular car. In these days when the competition for dealers is keener than ever before, it is not likely a factory will cancel the contract of an otherwise satisfactory dealer because he refuses to accept its views on the accessories he should handle.

What Will Appear on the Automotive Map in 1930?



Whatever may be done by car manufacturers in the accessory field will be experimental and it remains to be seen whether the profits will be sufficient to justify the cost. Its application will be gradual under any circumstances.

If the largest producers ultimately make themselves entirely independent of parts and accessory makers in all other respects, it is conceivable that they may also decide to make their own tires, and tires constitute the biggest single factor in the parts field. Up to this time, however, there has been no indication that they expect to do so. Such a venture would not be a success unless the replacement market were cultivated, because even Ford, with 50 per cent of the total number of units, could not produce tires as cheaply as he can buy them without a considerably larger outlet.

Tire Future Is Obscure

The future of tire manufacturers is more obscure than that of those in any other branch of the industry. Demand falls far short of equaling productive capacity and this has led to the present ruinous competitive conditions. Those companies which make other lines of rubber goods for which there is a steady demand are in a fortunate position. Bankers who control a good many of the larger companies may force consolidations but it is doubtful if any permanent improvement would result from such a move because it has been the history of the industry up to this time that in periods of scarcity tire factories spring up like mushrooms.

So far as body building is concerned, approximately 90 per cent of the business now is concentrated in the hands of a few large producers. The productive capacity of the smaller manufacturers materially exceeds the 10 per cent of the total business which is open to them. The time probably will come when practically all the leading motor car companies will make their own bodies either by erecting their own plants or by acquiring financial control of their sources of supply. This would mean that the smaller body builders would have to rely chiefly upon custom business unless they went into some other line of manufacture.

Coming again to the much-discussed subject of mergers in the passenger car field, they may be advisable theoretically but the practical logic of such a move is not so strong that it stands out like a sore thumb. Eliminating Ford and General Motors, which are in a class by themselves, there were fifteen companies which made more than 10,000 cars last year. Six of the fifteen make more than one line. Nine of the fifteen made 40,000 or more units and all of them returned large profits. They are all in stronger financial position than ever before and it is difficult to see where they would profit materially by entering into manufacturing combinations, because their overheads are not abnormal and it is doubtful if they could be reduced very materially by consolidations. The remaining six make distinctive products and they are big enough to do business successfully on a national basis.

Personality Is Important Factor

The remainder of the companies in the field are able to exist chiefly because of their personality and if that personality were lost in a merger the loss probably would exceed any possible economies.

Analysis of the situation as it stands today, therefore, does not indicate that any really important manufacturing consolidations are to be expected in the near future.

So far as the passenger car companies are concerned, distribution is a more difficult problem than production. There are not enough experienced and financially strong dealers to go around. One solution would be for non-competing lines or companies in the same price class with widely varying products to agree that they would sell

through the same dealers. This would permit a material reduction in merchandising costs and wider distribution than otherwise would be possible.

A similar dealer policy might be profitable for the small concerns which, standing alone, are justified in seeking only limited distribution.

The commercial vehicle industry has so many ramifications that its future is wholly problematical. There are comparatively few companies which have any excuse whatever for seeking more than local distribution. In their case the only kind of combinations possible would be the establishment of what would amount to local assembling plants with a common purchasing department which could buy in large enough quantities to keep costs down. There are so many difficulties in the way of such mergers, however, that they are unlikely on a large scale.

So far as the larger companies are concerned, collateral lines of activity are constantly being developed which will be profitable if they take advantage of their opportunities. There is no reason, for example, why truck makers should not monopolize the bus field. Demand in this direction is increasing amazingly. The same is true of rail-cars.

Actual mergers among the larger makers of commercial vehicles are no more probable than in the passenger car branch of the industry but the need for reducing merchandising costs is even greater. Much of their business is done at heavy cost through factory branches and it should not be impossible to work out agreements which would permit substantial reductions.

Common Interests Demand Cooperation

While competition in the automotive industry always will be sharp, there are, and will continue to be, common interests which will dictate a certain degree of cooperation. Manufacturers of component parts can be expected to serve the best interests of "specialized unit" producers in both passenger car and commercial vehicle fields and vice versa. Self-preservation decrees such a step. The aggregate resources, both mental and material, of the companies in this category are very large and the indications now are that they will work out their own salvation without many actual physical consolidations.

Another avenue for expanding trade is open to the parts company. That is the overseas market where expansion promises to be as rapid, in proportion, as it has been in this country. The American branch of the industry dominates the foreign field and it will continue to do so unless it is hopelessly stupid, which it isn't.

Something akin to an automotive boom has been apparent in many countries in the past two years and it will extend to Europe as soon as economic conditions become more stable, as it seems apparent they soon will. Demand will be measured only by the speed with which highways are developed and the world as a whole is taking a greater interest in good roads than it ever did before.

Only within the past two years have parts makers, with a few notable exceptions, sensed the possibilities of overseas sales and even now they are not devoting as much attention to them as they should. Anchors thrown to windward now may serve to keep the ship of business steady in days to come. It is quite conceivable that by 1930 the annual exports of motor vehicles will approach 1,000,000, and the demand for parts and accessories will be in proportion.

Another point worth considering in any approximation of the future is that it has been the history of every industry in which there has been an era of consolidation after a tremendous increase in the demands for its products, there has followed a period in which a great many small companies have sprung up and have carved out a

(Continued on page 730)

Closed Car Output Expected to Reach 39 Per Cent of Total in 1924

Small production cars in middle price class plan the largest relative increase in the production of such models.

Market for materials and equipment grows.

By Norman G. Shidle

ALL of the important automobile manufacturers are planning to build a greater proportion of closed models this year than they did in 1923, according to a survey just completed by the research department of AUTOMOTIVE INDUSTRIES. Small producers in the middle price group expect to increase closed car output very materially, but the large companies probably will make only moderate gains. For this reason the percentage of closed car production for all makes is not likely to go above 39 in 1924, but increases in certain individual cases will be large.

Out of 17 manufacturers who are planning to step-up closed car output by 15 per cent or more this year, 11 sell cars priced between \$1,000 and \$2,000, while 13 had a production of less than 10,000 last year. The big individual increases in percentage of closed model production is to be in this group.

There can be no doubt about the growing popularity of the closed car. The smaller production companies in the highly competitive middle price class have sensed this fact clearly and are planning to put special effort of closed car sales as one means of maintaining their relative position in the industry this year. Preliminary estimates show that many of these companies in whose 1923 production closed jobs comprised 20 to 30 per cent are planning to increase the proportion of such models to 40 and 50 per cent in 1924. Others whose 1923 closed car output ran 40 to 50 per cent are stepping up this year's schedule to 50 and 60 per cent; one company in this group expects to make 70 per cent of its production closed jobs.

Keen Competition Predicted

The ability to gage closed car demand this year is more important than ever before. Competition will be even more keen before the next twelve months have passed than it is today. Dealers who can deliver promptly the kind of models most in demand will be in a particularly favorable position. Whether the companies which are stepping up closed car output materially have guessed closer in making their estimates than have their competitors remains to be seen. It is significant, however, that a most successful producer in the under 10,000 production class last year is planning to make 65 per cent of his total production closed jobs this year, while in 1923 his figure was 45 per cent. Past experience has proved this particular manufacturer to have been an exceptionally good guesser as regards general trends in the industry and it will be interesting to see how close he has come to hitting the nail in this instance.

With one exception, no startling increases in proportion of closed models are planned by makers of high priced vehicles. This is to be expected as the average closed car production of vehicles selling for \$3,000 and over had al-

ready reached 60 per cent last year. Moderate increases are planned by practically every company in this group, the only large increase being in the case of a company which last year built a far smaller proportion of closed jobs than any of its direct competitors. This organization expects to step up its closed car production from 27 to 75 per cent of its entire output.

Closed Car Output in Low Price Groups

Builders of low priced vehicles estimate their 1924 production of closed jobs at only a few per cent higher than in 1923. The slow increase in this group probably can be explained by the fact that the price appeal plays a relatively large part in the sale of such cars. The man who buys a low priced car is likely to be in search of rapid transportation at the lowest cost; often he cannot afford the added comfort and added expense of protection from weather. Consequently manufacturers of such cars find it necessary to increase their proportion of closed jobs at a comparatively slow rate.

Those manufacturers who have brought out relatively low priced closed models and thus reduced the spread in price between open and closed types have increased materially their proportion of closed car sales. Analysis of the closed car figures for past years shows clearly the point at which any individual company put on the market a low priced closed model.

Consequently those manufacturers who recently have announced such cars have a sound basis for expecting to increase considerably the percentage of their closed car output. One important maker, who has built only the regular sedan and coupe models up to this time, is planning to double his closed car percentage coincident with the announcement of a utility closed model.

Outside of electric vehicles and taxicabs, which always have been practically 100 per cent closed, the highest percentage of closed jobs estimated by any company for 1924 is 85. Two makers are planning this high mark, one of whom builds extremely luxurious cars. The closed models made by the other are priced around \$1,700.

Some Increases Small

Probably no car builder will let his closed car percentage drop below 25 this year and only one or two seem to be working close to that figure. Practically every manufacturer whose estimate for 1924 runs below 35 per cent makes a car which sells for under \$1,000.

Study of available figures back to 1915 bring out the interesting fact that the high production companies in every price class, generally speaking, have been slower to increase their closed car output than the smaller organizations. The demand for greater protection, utility, and comfort was met more quickly in nearly every price group

by those organizations which made relatively few cars and which were able to adapt their schedule readily to changing market requirements. One car which is a dominating factor in a high priced group, for example, increased its percentage of closed car production from 1916 on in approximately the following steps: 13, 28, 35, 45, 47, 58, 60, 63. Another prominent high priced car, on the other hand, with a much smaller production started to make a larger number of closed cars early in the game and its percentages for similar years ran: 25, 33, 40, 46, 52, 60, 90, 85.

Advantage of Low Production

The smaller companies undoubtedly are at an advantage when it comes to changing models and types rapidly to take advantage of immediate sales possibilities. In this flexibility lies one of their chief strengths.

The fact that about 39 per cent of all cars built in 1924 probably will be closed models is a fact of significance to varied automotive interests. To the body builders it may mean an opportunity to allow demand to catch up with capacity. The forecast is particularly favorable to the independent body maker who is especially interested, in most cases, in closed body work. Not only is a larger production of closed jobs to be expected, but the companies which are planning the greatest increases are the middle-price small production organizations which are good customers for the independent body builder.

These smaller passenger car companies have no facilities for making their own bodies and most of them never will have. Their total body requirements, while not large, are such as to call for high grade workmanship and originality in design. Such passenger car manufacturers depend very largely on their body styles to put sales quotas over the top and they usually are open to suggestions on originality of design and equipment.

If the industry builds 4,000,000 passenger cars in 1924, something like 1,560,000 probably will be closed models. This would mean that nearly as many closed cars will be built in 1924 as there were cars of all types in 1921 and 1916. Last year closed car output totaled about 1,272,000.

Big Business for Body Builders

There is every indication at the present time that total 1924 passenger car production will exceed that of 1923, but even if the unexpected happens and the total output this year turns out to be the same as last, the number of closed cars built probably will increase by some 145,000 to 150,000. Assuming an average wholesale price of \$700 for these cars, this gain in production would mean an increase in wholesale value of closed cars of about \$101,500,000.

Thus, even if it be assumed that 1924 production will not run ahead of 1923, an increased business of something like \$81,300,000 probably will be available for body builders and for companies manufacturing materials and supplies for body construction. This figure is arrived at by taking 20 per cent from the wholesale value estimated above. If production should continue at its present rate throughout the year this total would be increased materially.

Added service work required by an increase in number of closed bodies also will add to the market for certain types of material.

There is a growing demand on the part of the public for closed cars. The industry has recognized this fact for some time and has been devoting strenuous efforts to meet the desires of its customers. A large measure of success already has been achieved in combining quality, comfort and low price. As future developments widen the closed car market the industry, those who supply materials to it, and those who use its products, will benefit mutually.

New Books Suitable for the Business Bookshelf

INCREASING use of furnace equipment in practically all metal working industries has resulted in an enormous expenditure for fuel oil and other fuels and far greater attention to economies in their use. Savings in this direction are so great in some organizations as to make it well worth while to employ experienced engineers whose duty it is to see that fuels are used to the best possible advantage. In other cases plant managers are called upon to perform similar duties and must, therefore, become familiar with combustion engineering problems.

As an aid to those engaged in work of this character The Calorizing Co. of Pittsburgh recently has issued a volume called *The Calco Handbook of Recuperation*, which contains a large amount of useful information and data on combustion, as well as descriptive matter regarding recuperators manufactured by the Calorizing Co. These recuperators are employed for extracting from the flue gases of all kinds of furnaces a considerable proportion of their heat content. This heat raises the temperature of air used for combustion and not only saves heat by this means, but makes it possible to secure more nearly complete combustion than is commonly obtained without preheating the air.

The advantages and reasons for recuperation, principles of combustion, and means for improving combustion, reduction of oxidation, advantages of higher flame temperature for certain classes of work, the process of calorizing and economics of recuperation are some of the subjects treated. The book is much more than the ordinary catalog and contains much data in the form of tables and curves which are useful in solving problems which very frequently confront combustion engineers.

DIAGRAMS are a favorite tool of the engineer and are used almost universally in presenting the results of engineering research. There are many different forms of diagram, and a regular science (nomography) has been developed around the subject in the last few years.

Those who have occasion to use diagrams frequently will be interested in a book on the subject recently issued by the McGraw-Hill Book Co., Inc.—*The Design of Diagrams for Engineering Formulas and the Theory of Nomography*, by Laurence I. Hewes, B.S., Ph. D., and Herbert L. Seward, Ph. B., M.E. More than fifty general types of equation are dealt with and an equal number of specific examples are worked out.

The pages of the book measure 9 by 12 in., which permits presentation of sample diagrams on a large scale, so they can be easily read. The authors have been teaching nomography at Sheffield Scientific School and have studied carefully the problems involved in this subject.

SOME investigations on the effect of speed on the stresses in gear teeth, by means of the photo-elastic method, were recorded in a paper by Paul Heymans and A. L. Kimball, Jr., presented to the American Society of Mechanical Engineers. Measurements were made on a 13-tooth pinion of 6.118 in. pitch diameter, through which a constant resisting torque of 125 in.-lb. was overcome, and it was found that the tension in the forward side of the tooth near the root increased from 36,400 lb. per sq. in. at no speed to 69,200 lb. per sq. in. at 1248 r.p.m., or a pitch line velocity of 2000 ft. p. m. The increase in the stress due to the speed amounted to 92 per cent.

Education of Pedestrians Needed to Lower Traffic Hazards

Leading executive outlines five methods of increasing safety in congested districts. Advocates strict enforcement of law requiring slow moving vehicles to keep on right side of road.

By A. B. C. Hardy

President, Olds Motor Works

PROPER regulation of traffic and the education of pedestrians are the two most needed requirements for the reduction of the number of traffic accidents. Every automobile association, dealer and owner should bring pressure on their city and State officials until progressive plans of traffic regulation and education are accomplished facts.

The following methods might be used to advantage in reducing traffic difficulties:

1. National coordination of traffic laws so that drivers will be governed by but one set of rules.
2. Designation for automobile use of certain streets which have no street car traffic.
3. Discouraging the driving of automobiles on principal city thoroughfares which carry heavy street car traffic. This can be done by eliminating right and left hand turns at each corner.
4. Detailing traffic policemen at all important intersections in the city and at important State and county road crossings out of the cities on weekends and holidays when traffic is heavy.
5. Strict enforcement of the old rule, now almost forgotten, that slow-moving vehicles must keep to the right of the road. This should apply both in and outside cities.

Too Many Different Laws

The very multiplicity of traffic laws and ordinances in the various States and, in fact, in adjoining municipalities, mitigate against their proper enforcement. It is no impossible task for the 48 States to codify their laws so that all will be the same, and there is no reason why every municipality should not adapt its ordinances to the State law. If city ordinances must differ, let them differ as to the penalty to be inflicted.

One of the great problems in all cities is that of congestion which tends to increase the accident hazard. The tendency in more progressive municipalities is to do everything possible to separate automobile and street car traffic. This is proving a boon to the pedestrians, street car riders and automobile operators and should be inaugurated more extensively in every closely populated center in the country. The quickness and ease with which automobile traffic is handled on Fifth Avenue, New York; Second Boulevard, Detroit, and Michigan Boulevard, Chicago, are but three instances that prove the feasibility of this plan.

When the automobile was first coming into general use there were to be found on many of the principal streets and roads in the country signs which read, "Slow going vehicles, keep to the right." These were meant chiefly for the horse-drawn wagons, but as the horse disappeared, so have the signs. But there remain automobile drivers who prefer to go along slowly.

I am not advocating speeding, but when the law permits driving at a 30 or 35 mile an hour rate on country roads, it is not consistent to allow a driver who prefers 15 miles an hour to hold others back.

More Traffic Officers Needed

As to the need of more traffic policemen at important intersections, including main traveled roads outside cities, this is so well recognized that comment is unnecessary.

Statistics prove that heavily traversed sections of the city have few accidents. This is because traffic regulations are more rigidly enforced and observed at such points.

In such localities pedestrians forget to look for vehicles and dart out in the streets without looking. Far too often they step from behind parked cars directly in the path of approaching automobiles. Such accidents are beyond the control of the driver. The only method of combating them is by a perpetual campaign of education so that the public ever will have in mind the danger of stepping from a curb in any locality without first scanning the street for danger.

Material sign posts are not possible, but every pedestrian should automatically visualize the railroad crossing sign, "Stop, Look and Listen," when they start to cross the street. Only education, and plenty of it, will make that possible.

In Next Week's Issue—

An article will appear summing up what car manufacturers think about the present balloon tire situation. A few days ago we asked a number of them these questions:

1. What do you think of the set of 23 balloon tire standards set up by the Rubber Association?
2. What can be done to reduce the present disparity between public demand for balloon tires and the ability of tire manufacturers to supply them?
3. What has been your experience in the use of so-called balloon tires on cars with wheels of standard size?

As a result of the answers given AUTOMOTIVE INDUSTRIES will be able to present an authoritative resumé of car makers' ideas on this important problem.

S. A. E. Launches Ambitious Research Program for 1924

Study of fuel and its effect upon crankcase oil dilution, and ease of starting will be continued. Impact tests, investigation of truck transportation costs and riding qualities are also to be given consideration. H. L. Horning is committee chairman.

FIVE main projects are contained in the program of research work scheduled for consideration by the Research Committee of the Society of Automotive Engineers during the current year. These include:

- (1) The cooperative fuel research which is being continued by the Bureau of Standards in cooperation with the society, the National Automobile Chamber of Commerce, and the American Petroleum Institute.
- (2) Highway tests by Bureau of Public Roads, cooperating with the society and the Rubber Association of America.
- (3) Study of truck transportation costs, with special reference to the effect of the highway on such costs.
- (4) Research calculated to learn the character and relative importance of factors which affect riding comfort.
- (5) Gear research, intended to establish a basis for satisfactory gear standardization.

Harry L. Horning is serving as chairman of the research committee which is to be divided into groups, similar to the divisions of the Standards Committee of the society, each charged with guidance of the activities along research lines which fall within its particular province.

Fuel Research Continued

Cooperative fuel research at the Bureau of Standards is expected to include some further study of the factors which influence the dilution of crankcase oil. It is proposed to learn, for example, why dilution is so much greater with cold jacket water than with hot and whether, under laboratory conditions, an equilibrium is reached in respect to percentage of dilution; that is, whether dilution increases up to a certain per cent and thereafter does not increase materially. Such a condition was found in some road tests made by various car manufacturers and reported upon at the last annual meeting of the Society.

Other tests, intended to determine the effect of various factors upon the ease of starting with various grades of fuel, now are in progress at the Bureau. These are being made on a car in which the engine is cranked at various desired speeds by driving one rear wheel with gears and clutch engaged.

It is expected that the effects of temperature, gas velocity and spark advance upon ease of starting will be determined.

In addition to the foregoing investigation, probably there will be some tests intended to learn just what is the effect upon lubrication and wear of diluted crankcase oil.

The Research Department already is collecting data on methods and equipment for preventing or minimizing dilution. Some manufacturers are understood to be studying the feasibility or desirability of injecting fresh oil on cylinder walls.

Road Durability Tested

Further tests intended to determine the effect of impact on the durability of roads of various constructions are being arranged for by the Bureau of Public Roads. The Highways Committee of the society has been cooperating in this research for some time. In order to simulate, so far as possible, conditions of normal service in making these tests, it is proposed to determine the impact forces which occur in such service. One way to do this is to measure the vertical acceleration of a point at the center of a wheel under the particular condition in question. Knowing the weight on the wheel, it is possible to figure the impact on the road. Incidentally, the reaction of the road on the wheel also can be measured, thus affording useful information for the designer.

Instruments for measuring accelerations of this character now are being developed and shortly will be put into service. After the desired measurements are secured, the information obtained will be applied in making tests on the experimental strip of road which the Bureau of Public Roads has constructed.

An effort to collect data showing how the character and condition of road surface affects the cost of transportation by trucks is being made by the society in cooperation with the National Research Council. Some useful particulars are in hand, but it has been found that relatively few fleet operators keep reliable records and that of those who do there seldom is a differentiation tending to show what affect the road surface has on operating cost. A number of fleet operators, including the Post Office Department, are expected to cooperate in securing the desired data.

Riding Comfort to Be Investigated

Some information regarding the proposed investigation of various factors which affect riding comfort was contained in AUTOMOTIVE INDUSTRIES' report of the annual meeting of the society held last January. The purpose of this research is to establish a rational and fundamental basis for the design of automobiles in respect to riding qualities. At the present time such design is quite largely empirical for the reason that it is not known definitely to what extent various design features affect the comfort of those who ride in them.

To arrive at conclusions in this matter will require psychological and physiological as well as mechanical and

physical research work. For this reason contact has been established with the American Medical Association and it is expected that there will be on foot soon plans for co-operation with experts in the study of physiological and psychological problems such as are involved in this matter.

Here also there will be need for sensitive instruments for the measurement of periodic vertical accelerations of various frequencies and amplitudes and considerable research will be required for their development before certain aspects of the main problem can be attacked. Much assistance from engineering schools in this direction is anticipated.

It has not yet been decided what, if any, action will be taken in respect to gear research problems. It is planned, however, to call a conference on this subject during some one of the meetings of the society to be held in the near future. The industry already has been circularized by the Standards Department with the object of getting some sort of consensus of opinion in the matter.

It has been suggested that the Research Department

collect as much information as it can in relation to various balloon tire problems, with a view to learning what are the controlling factors in relation to size, number of plies, inflation pressure, etc. Such data could be used to advantage later in the formulation of standards.

A list of members of the 1924 Research Committee follows:

H. L. Horning, Waukesha Motor Co., Chairman, H. W. Alden, Timken-Detroit Axle Co., B. B. Bachman, Autocar Co., O. C. Berry, Wheeler Schebler Carbureter Co., H. M. Crane, General Motors Corp., H. C. Dickinson and W. S. James, Bureau of Standards, E. A. Johnston, International Harvester Co., C. F. Kettering, General Motors Research Corp., T. J. Little, Jr., Lincoln Motor Co., Thomas Midgley, Jr., General Motors Research Corp., F. C. Mock, Stromberg Motor Devices Co., A. L. Nelson and S. W. Sparrow, Bureau of Standards, P. S. Tice, Stewart-Warner Speedometer Corp., J. G. Vincent, Packard Motor Car Co., E. P. Warner, Massachusetts Institute of Technology, R. E. Wilson, Standard Oil Co.

Barnes Drill and Tapper Has Square Column and Oil-Channel Table

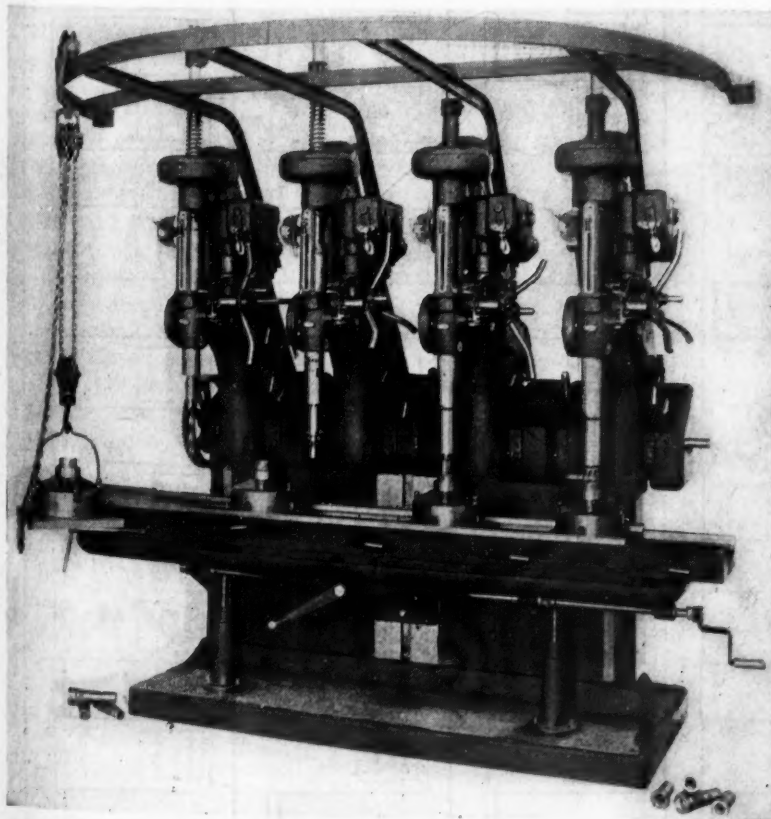
THE familiar type of drill press has a round, machined column and a round table supported by a bracket capable of swinging on this column. This construction, however, does not always meet present production requirements, especially where large jigs are used. For production work under modern conditions the Barnes Drill Co. of Rockford, Ill., has brought out a new design of its self-oiled all-gearred drill and tapper which has a heavy column of square section and a large oil-channel table.

The base can be furnished with a finished surface and T slots if desired, it being an easy matter to remove the table after loosening the gibs on the column ways. The

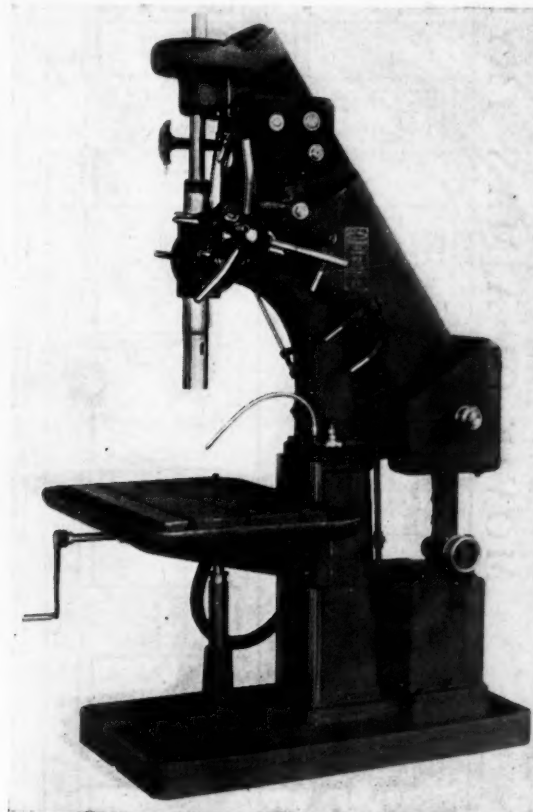
intention of the designer, however, was that most of the work should be done on the table, and plenty of strength and rigidity have been provided by the method of fastening to the column ways and by the raising screw support.

The power of the new drill is the same as that of the Barnes 4-in. self-oiler and the general dimensions also are substantially the same. However, the same construction now is available also in the 20-in. size, and in the future it will be possible to furnish all sizes of the all-gearred drill in this construction.

An accompanying photograph shows a new development of the Barnes four-spindle 24-in. gang drill.

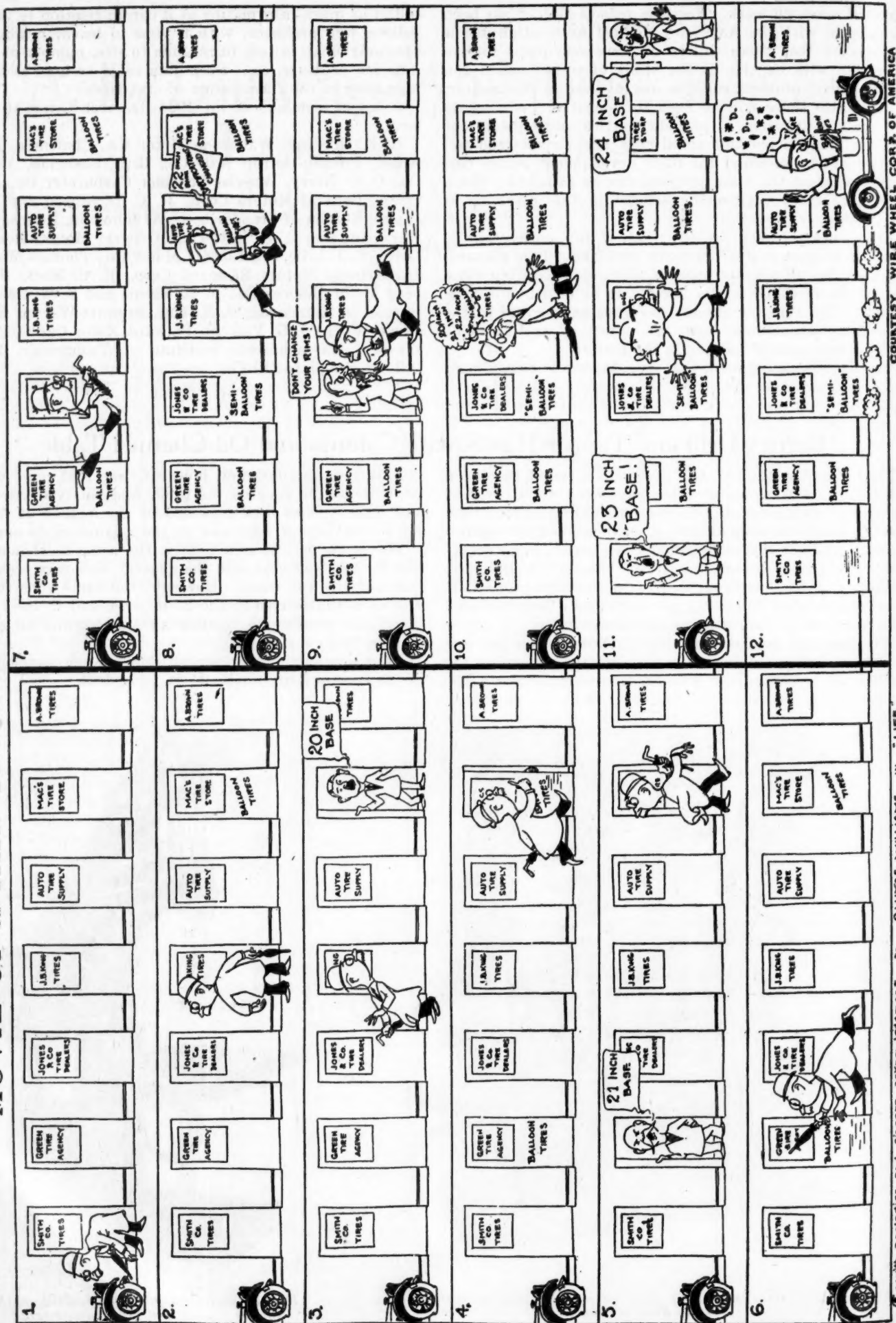


Barnes four-spindle 24-in. gang drill with trolley for returning jigs to loading station



Barnes self-oiled all-gearred drill with square column and rectangular table

MOVIE OF A MAN TRYING TO BUY BALLOON TIRES



COURTESY WIRE WHEEL CORP. OF AMERICA

with apologist and sincere acknowledgment to GUYAS. WILLIAMS IN "LIFE".
A twelve-panel feature showing the need for standardization of wheel and rim sizes

Ridiculous to Have 23 Balloon Tire Sizes, Says Firestone Engineer

James E. Hale states that his company makes but five sizes which are by far the most widely used. Asserts that narrow rims give better flexing conditions and are lighter and cheaper. Believes low pressure shoes soon will be used on light trucks and buses.

CONSIDERABLE light was shed on various questions pertaining to balloon tires at a recent meeting of the Pennsylvania Section of the Society of Automotive Engineers. James E. Hale, manager of the Development Department of the Firestone Tire & Rubber Co., was the speaker. Some of the high spots in his talk follow:

It is ridiculous to have 23 sizes of balloon tires. Firestone is making only five and these are by far the most widely used sizes. Final rim diameters probably will be either 20 or 21 in. Narrow rims are not only lighter and cheaper than wider ones but give better flexing conditions for the tire. Whatever side swaying tendencies balloon tires may give are soon forgotten by the user. There is absolutely no danger of the tire rolling off the rim.

Once in large quantity production, the cost of balloon tires is not expected to exceed that of high pressure tires, but this depends in part upon the size of the balloon tire in comparison to the one replaced. In the long run with balloon tires costs per tire mile will be less and there will be less rapid car deterioration.

Truck Development Work Needed

Some work has been done in developing balloon tires for trucks, but much more must be done before such tires are ready for the market. It is probable, however, that tires of 7.30 in. section will be available for three-quarter ton speed trucks in a reasonably short time.

There are great possibilities for balloon tires for buses, but much development work must be done before they become available for large buses. Balloon tires as now developed probably will be satisfactorily for buses of 12 to 15 passenger capacity. There appears to be no reason why balloon tires cannot be used on dual rims, but the matter has not been given consideration.

Properly inflated balloon tires of the right size give mileage considerably in excess of high pressure tires, but under-inflation and overloading is just as destructive as with the high pressure variety. There are no more punctures with balloon tires than with other tires, but over-inflation renders the balloon type more susceptible to puncture and less likely to give satisfactory service. Thirty-five pounds probably is the maximum pressure desirable. Balloon tire treads wear very smoothly. There is almost no cutting or chipping.

A deep section balloon tire is necessary to give sufficient cushioning and still avoid bruise breaks. A 7.30-in. balloon tire allows the wheel to drop $4\frac{3}{4}$ in. upon deflation from normal pressure, as against $3\frac{7}{8}$ in. for the corresponding (33 x 5 in.) high pressure tire. There is no more danger from sudden deflation of balloon tires when

the car is running at high speeds than there is with high pressure tires.

With balloon tires it is quite as easy to get out of ruts, as on frozen muddy surfaces, and to negotiate bad places. Powerful cars with 7.30-in. tires and chains on driving wheels will go through any mud up to the point where the axles are dragging. Traction and braking effect are increased by the use of balloon tires.

Lower Fuel Consumption Claimed

Lower fuel consumption is realized with cars fitted with balloon tires and is believed to be due, at least in part, to less wheel slippage, ability to maintain a more nearly uniform speed, and decreased energy dissipation in running gear, chassis and body motions. Shock absorbers or rebound checks are likely to see much wider use to prevent what is sometimes termed "bouncing" or "galloping."

Balloon tire tubes are substantially the same thickness as are tubes for high pressure tires.

With balloon tires it is hoped that the practice of oversizing will be unnecessary.

Mr. Hale explained that minimum inflation pressures for balloon tires in general should be about 25 lb., but that the minimum safe pressure is dependent upon load, which in turn determines tire deflection. Pressures of 20 lb. or less are permissible in some cases.

In view of discussion in favor of wider rims it is interesting to note that Mr. Hale continues to favor the narrow variety, which he says allows the tire to flex more freely. Such side sway as is encountered he considers inconsequential. He said, however, that Firestone tires will operate satisfactorily on wider rims if anyone prefers to use the wider variety.

Sizes Limited

It is Firestone practice to limit 4.40-in. section tires to 750 lb. load., 5.25 section to 1000 lb., 6.20 to 1300 lb. and 7.30 to 1700 lb. The 4.40 section is recommended for cars in the Ford, Chevrolet and Overland class, 5.25 section for cars such as Maxwell, Oakland, Buick Four, Cleveland and Jewett, 6.20 section for cars such as Reo, Buick Six, Studebaker Special Six, Jordan and Packard Six, and 7.30 section for cars such as Cadillac, Lincoln and Packard Eight.

It is Mr. Hale's belief that mileage life will be considerably in excess of that usual with high pressure tires. Tread separation and separation between plies, he said, is entirely absent in balloon tires, due to the soft, yielding nature of the tire and the low inflation pressure. Treads wear very smoothly, without cutting and chipping. Many balloon tires have gone 8000 or 10,000 miles with hardly a blemish on the tread.

If proper size balloon tires are selected, Mr. Hale said, an inflation pressure of 25 or 30 lb. will give ample comfort and cushioning effect without any need for under-inflation. For this reason it is expected that trouble due to under-inflation will be less frequent than at present. It is, however, quite as destructive to run balloon tires under-inflated as it is to run high pressure tires without sufficient air pressure. Furthermore, the pressures recommended are the actual pressures which the user is expected to employ. This point was stressed for the reason that the table of inflation pressures for high pressure tires gives pressures which are known to be unnecessarily high. With balloon tires it is not safe to discount the pressure recommended in the Firestone table.

Puncture Experiences Recounted

On the subject of punctures Mr. Hale recounted various experiences of cars which had run 15,000 to 23,000 miles with balloon tires with only two or three punctures. In general, he said, punctures are no more frequent than with high pressure tires.

The need for a tire of deep section was explained about as follows: Low pressure makes it possible to drive with comfort at higher speeds than are comfortable with ordinary tire equipment. Consequently less attention is paid to ruts and other road irregularities, and these often are struck with more force on account of the higher speed. If, then, the impact is sufficient to deflect the tire enough to cause it to be pinched between tire and the rim, a bruise break is apt to result. A deep section, of course, enables the tire to deflect a greater distance without fetching up solidly.

With the semi-balloon tires, said Mr. Hale, the danger of bruise breaking is very much greater. Also with the semi-balloon in low pressure, the flexing is so great that not only is side wall trouble likely to occur but trouble around the bead portion. Therefore, he is very much of the opinion that semi-balloon tires are going to give disappointment to the owner. An exact definition of semi-balloon tires was not given.

In applying balloon tires to existing cars considerable interference with brake mechanism was anticipated but, Mr. Hale said, it has proved to be possible to avoid this in the majority of cases by offsetting the wheel sufficiently.

Tendency to Shimmy Questioned

In the discussion, Charles Guernsey asked whether or not the front wheels are more liable to shimmy with balloon tires. To this Mr. Hale replied that shimmying had been encountered with some cars fitted with balloon tires when it was not experienced with the regular equipment. He said further that when it occurs at 20 or 30 m.p.h. it is due, as a rule, to play or loose steering connections. Shimmy at high speed is not very frequent and its cause not well understood.

In reference to the danger from blowout at high speeds, Mr. Hale said that tests had been made at speeds of 30, 40 and 50 m.p.h. At each of these speeds a hole was shot into one front tire without any serious result. He gave it as his belief that there is no more danger from this source with balloon than with high pressure tires.

In service on Yellow cabs, Mr. Hale said that one tire had gone over 20,000 miles, two 15,000 to 20,000, twelve from 12,000 to 15,000, eleven from 10,000 to 12,000, etc. One engineer connected with a manufacturer of steel wheels, Mr. Hale said, had driven 23,000 miles on one set of balloon tires and expects to secure a good many thousand miles of additional service from the same set.

"There are," said Mr. Hale, "great possibilities in bal-

loon tires for bus operation, but much development work is yet to be done along this line. The 7.30 tires now developed will probably be satisfactory on 12 or 15 passenger buses, but not for larger ones with single tire equipment."

Tires as Related to Springing

One speaker connected with the Yellow Cab Co. substantiated Mr. Hale's statements to the effect that cars equipped with balloon tires travel further per gallon of gasoline consumed, but Walter Newkirk said that the reverse was true in the case of his car. This, he said, might be due to the fact that the engine speed has been slightly increased owing to a smaller wheel diameter. The difference, however, is not great.

Mr. Newkirk said that a little shorter and stiffer springs can be used with balloon tires without much change in the result as compared to ordinary tires, but that if best results are desired it is necessary to face the problem in exactly the same way as with standard tires. He added that with his car he had driven over broken glass at rather high speed but that the tires were not cut.

E. A. Nelson of the Budd Wheel Co. said that some companies are asking for rims as wide as 6 in. It is his belief that a wider rim protects the tire.

Answering a question concerning the use of balloon tires on dual rims, Mr. Hale said that it never had been considered, to his knowledge, but that he did not see any reason why it would not work. He said that the greater flexibility would be beneficial rather than a detriment in such a case.

Tendency to Over-inflate Balloon Tires

B. B. Bachman brought out the point that the public is quite used to high inflation pressures and, therefore, may have a tendency to over-inflate balloon tires. He asked what the result would be. Mr. Hale replied that, in his judgment, four-ply, large section balloon tires should not be inflated to more than 25 lb. under any circumstances. Too high pressures make such a tire much more easily punctured.

Mr. Bachman said that the difference in diameter between some of the balloon tires and the high pressure tires which they are intended to replace appears to be unnecessarily large. In reply to this Mr. Hale said that the 30 x 3½-in. fabric tire used on Ford cars has a standing diameter of 30 7/16 in. as compared to 30¼ in. for the 4.40 x 21-in. balloon which is intended to replace it. The 5.25 x 21 is most often interchanged with the 31 x 4. In this case the respective standing diameters are 32 5/16 for the 5.25 size and 32 5/8 for the 31 x 4. In the 6.20 x 20-in. size the diameter is 33.40 as compared to 33.54 for the 32 x 4½-in. high pressure tire.

The 34 x 4½-in. size used on Hudson and Nash cars is replaced in many cases by balloon tires of 6.20 in. section. In this case, said Mr. Hale, the variation is greater, but it is understood that these companies are contemplating lowering the wheel size so that the difference is expected to be cleared up.

Number of Sizes Should Be Reduced

The 7.30-in. tire which replaces the 33 x 5 is 35.18 in. standing diameter as against 35.39 in. for the 33 x 5.

Asked by Chairman Younger to say a word about the number of rim sizes, C. S. Holden said that 23 doesn't begin to cover it. He added that the coming of the balloon tire had brought a great multiplicity of sizes and sectional diameters and that the number should be reduced through standardization. He recommended that the S.A.E. make an effort to reduce the number of sizes and to get some real standards in use.

Permanent Mold Casting Methods Cut Production Expense

Chief problem in developing successful method was to regulate properly the cooling rate. The results achieved have resulted in better quality and less cost.

RECENT developments in permanent mold castings were outlined by D. H. Meloche of the Holley Carburetor Co. at the meeting of the Detroit Section of the Society of Automotive Engineers on Thursday, March 20.

After reviewing early attempts to produce castings in metal molds, Mr. Meloche described and discussed the method developed and now in extensive use by the Holley Carburetor Co. substantially as follows:

The company I am connected with were machining an intricate iron casting weighing 2 lb., with numerous bosses and with the thickness of the metal walls varying from less than $\frac{1}{8}$ in. to more than $\frac{1}{2}$ in. This casting had to be free from blow holes and porous spots, had to be uniformly soft throughout, and the increased production of Ford meant that large quantities had to be obtained each day. The castings had to be free from all shifts and were machined at the high speeds that are used today with "Stellite" tools.

Inspection of the castings frequently failed to reveal hidden defects, which subsequently resulted in machine scrap. Further, there was a possibility that some of the finished carburetors had porous spots which might possibly interfere with the operation of the carburetor.

Chilling of Surface Metal

The result of all this was that the source of supply had been narrowed down to one foundry and an alternative source of supply was urgently needed. The "Holley" molding machine is the result of development work which has been going on now for nearly three years. The problem was solved by studying a well known phenomenon in gray iron casting, namely, that when a sand mold is slightly damp the casting is slightly chilled. That is to say, the iron near the skin of the casting contains carbon in solution to such an extent that it is not easily machined. This is due simply to the fact that the sand mold is cooling the molten iron too quickly, and the silicon contained in the iron, in consequence, has no time to precipitate out the carbon as graphite. It was noticed, however, that immediately below the skin of the casting the iron was soft and gray, showing that once the moisture contained in the sand had been driven away the conductivity of the mold was reduced and freezing of the iron was no longer unduly accelerated.

Applying this principle to a metal mold, it was only necessary to delay the cooling rate so that it was appreciably lower than that of the damp mold but not as low as that of a dry mold, because obviously if the rate of cooling were no faster than in an ordinary sand mold in the dry condition, the rate of production of a molding machine would be limited. In other words, the highest rate

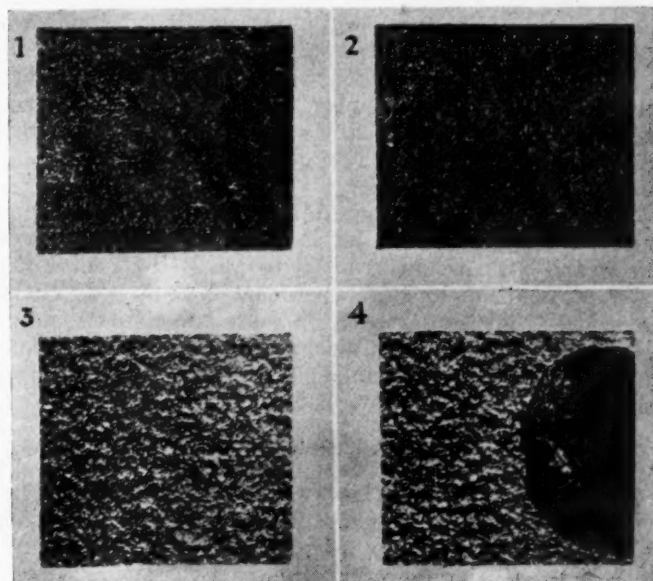
of cooling which does not produce a white iron is the rate which is most efficient economically. Regulation of the cooling rate therefore was the key to the whole problem. This regulation was obtained by controlling the following factors:

1. The thickness of the walls of the hollow metal mold. These walls are approximately $\frac{1}{2}$ in. thick. The molds are made of ordinary gray iron, being cast to shape in a metal mold. This makes it possible to preheat the molds quickly and also results in a fairly uniform distribution of heat throughout the body of the mold.

2. A heat barrier was provided between the molten iron and the mold, consisting of ordinary fire clay mixed with a heat-resisting binder so as to give a smooth, adherent coating which has been termed by Dr. Moldenke a "stone facing."

3. Finally this *stone face* was protected after each casting by a coating of lampblack conveniently applied by means of a smoky flame. While there may be some argument as to the function of this lampblack, I believe that a portion of the carbon so deposited is actually absorbed by the molten iron.

4. The fourth factor was the expansion of the iron when freezing. As is well known, gray iron, like water, expands on changing from the liquid to the solid state. Subsequently, of course, iron contracts as it cools. The molds therefore are arranged to be held together by pow-



Figs. 1 and 2—Fracture of iron castings made by the Holley process. Figs. 3 and 4—Fractures of sand-cast iron

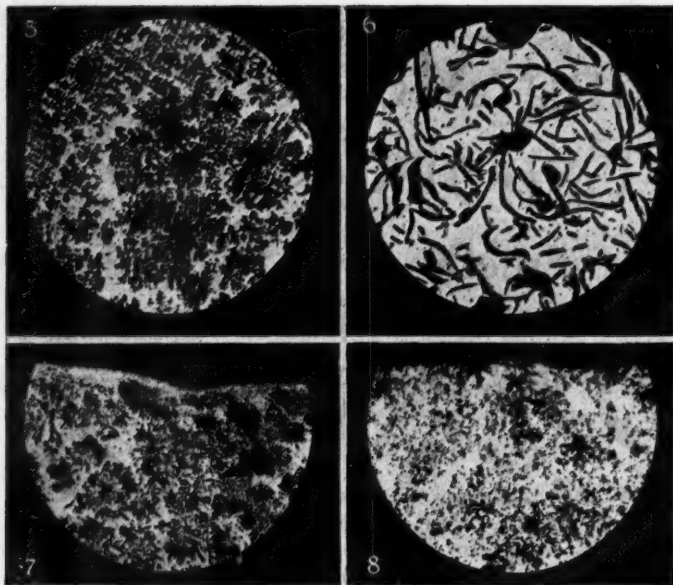


Fig. 5—Micrograph of core of iron die-casting, unetched, magnified 50 diameters. Fig. 6—Micrograph of sand casting showing large flakes of graphite. Fig. 7—Micrograph of surface layer of sand casting. Fig. 8—Micrograph of surface layer of Holley casting

erful springs which will yield under the expanding force of the freezing iron. In this connection it was found desirable to increase the draft slightly.

5. The temperature of the molds, to our surprise, was the least of our problems. Once the molds had been heated to the required temperature it was a very simple matter to hold the mold temperature between the wide limits within which soft gray iron castings can be produced. In fact, we ran over a year without any artificial cooling. However, by having artificial cooling, which is easily obtained by means of a blower or other suitable fan, the rate of production can be increased considerably.

6. The most important element, as in all machinery, is cleanliness, and we found that it was absolutely essential to blow out the molds between successive pourings. This is not only for the purpose of blowing out sand and dirt which might be left in the mold, but also because we find it desirable to have a fresh surface of lampblack for each casting. After having been used repeatedly lampblack begins to take on the characteristics of graphite, and this is absolutely useless for our purpose. An amorphous pulverulent coating of lampblack which is produced by a smoky flame has totally different chemical and physical properties than the crystalline graphite commonly used as mold facing.

7. As regards the range of mixtures that can be poured, from ordinary malleable iron having 0.75 per cent silicon and 2.5 per cent carbon to gray iron containing 3 per cent silicon and 3.75 per cent carbon, we believe that there is no iron in between these two limits that we cannot successfully cast. We have also poured aluminum and brass and have obtained very satisfactory castings, free from porosity and blow holes.

Shrinkage Phenomena

One peculiarity we noticed was that the shrinkage of the gray iron casting was only about one-half that which we would normally expect in sand practice. This is due, we believe, to the fact that the iron "contours" itself during the expansion stage, whereas in sand casting it "contours" itself during the contraction stage. In other words, we take advantage of the property of gray iron in

expanding on freezing to produce a superior casting with less shrinkage and therefore less variation in dimensions, and this question of variation is of importance when hundreds of thousands of castings are required to be machined with jigs and tools which can only be changed at great expense. The same reduction of shrinkage is also noticed with aluminum and brass castings and we believe that for this and other reasons our machinery and process are adaptable to non-ferrous as well as to the gray iron castings.

Iron castings made by this process differ from ordinary gray iron castings in that the fracture is darker and looks more like that of a high carbon semi-malleable than like that of ordinary gray iron. This carbon is temper carbon. That is to say, it is carbon in a minute state of division, whereas gray iron consists of graphite flakes or crystals sufficiently large to reflect light, to which property the characteristic appearance of gray iron when broken is due.

An examination under the microscope discloses the fact that the carbon is very uniformly distributed throughout the mass, that each particle of carbon is surrounded by an envelope of ferrite or pure iron and that there is comparatively little pearlite or combined carbon anywhere in the field. This is confirmed by chemical analysis, which shows little or no combined carbon.

In order to bring out the characteristic difference between sand-casting and die-casting, iron from the same ladle was poured into a similar sand mold so that the conditions of the iron would be the same in both cases and a true comparison could be made between the iron produced by the two methods.

Figs. 1 and 2 show characteristic fractures of "Holley" iron and Figs. 3 and 4 characteristic fractures of the same iron poured in a sand mold.

Micro-structure

In order to emphasize this difference, Fig. 5 shows a micro-section through the middle portion of the die cast iron, unetched, magnified fifty diameters. It will be noticed that the distribution of the carbon is uniform and the particles have a relatively small size. Fig. 6



Fig. 9—Group of castings now made by the Holley process

shows in the same magnification the distribution of the large graphitic flakes in the corresponding sand casting.

Fig. 7 shows to one hundred diameters the structure of the iron near the surface when casting in an ordinary sand mold. Although this sand mold was not what would be termed *damp* and corresponds to ordinary practice, there is a skin of chilled iron 0.001 in. in thickness. This surface chilling is characteristic of gray iron castings, but because of its shallowness does not make any serious difficulty in machining. The reason for showing this is to bring out the fact, as shown in Fig. 8, that iron cast by

our method shows the gray iron structure extending right up to the skin, proving in my opinion that there has been surface absorption of carbon by the molten iron from the surface of the mold during freezing. This iron is precipitated on cooling and the absorption of the carbon by the iron also helps to protect the iron molds, for the reason that the absorption of carbon by the molten iron is a reaction which absorbs heat and therefore reduces the thickness of the insulating coating required on the mold to avoid chilling. I might mention here that the thickness of the "stone face" on the surface of the mold is not over 1/64 in. and is usually nearer 1/100 in.

Fig. 9 shows a group of castings which we are making today in commercial production. On the extreme left is the carburetor casting for the Ford carburetor. Immediately behind this casting, and to the right, are two Ford pistons, one machined and one in the rough cast condition. These pistons are also being made today in quantities. To the right are two outlet covers for the "Holley" vaporizer which is part of the equipment of a Fordson tractor. This casting is of interest because it is the first casting in large quantities without a sand core. By producing this outlet cover we have demonstrated that a sandless foundry is an actual possibility, but the majority of castings of interest to automotive engineers obviously require cores.

Molds Also Cast

Fig. 10 shows the most interesting castings we have made by our method, namely, the molds themselves. These molds weigh upward of 35 lb. and are cast in a mold which is pivoted so that it can be inverted. This mold is in the shape of an open box, a permanent iron master being

placed on the bottom and a sand core superimposed upon it. The box is then rotated, so that the permanent master is in a vertical plane. The molds are then poured from the top end, the iron flowing over the core and permanent master. These molds are then ejected by hand and after being cleaned the molds are faced up so that the casting produced therein will be of the correct thickness. The only machining necessary is on the rib surrounding the mold. These molds are not produced by die sinking methods but are actually cast to shape. Of course, before the mold can be coated with our "stone facing" we find it necessary to clean up the surfaces, but this is a comparatively cheap operation.

Fig. 11 shows a closeup view of one of the molding machines. The sequence of operations in these machines is as follows:

After the iron has been poured into the molds they are held together by spring pressure for 35 seconds. The pressure is then released, the molds are opened, and the castings ejected by cast iron knockout pins which are coated the same as the mold. The molds, in the open position, then pass on opposite sides of a cleaning device which blows off the residual lampblack and any particles of sand which may have fallen off the cores. While still open they pass on opposite sides of a burner supported by a swinging arm. This burner travels with the mold for about 20 deg. and then swings back and is picked up by the next pair of molds. It thus dwells opposite the molds for an appreciable period (30 seconds). The burner was designed to give a more or less even distribution laterally but a slightly heavier coating in the upper portion of the mold, because, the mold being poured from the top, the

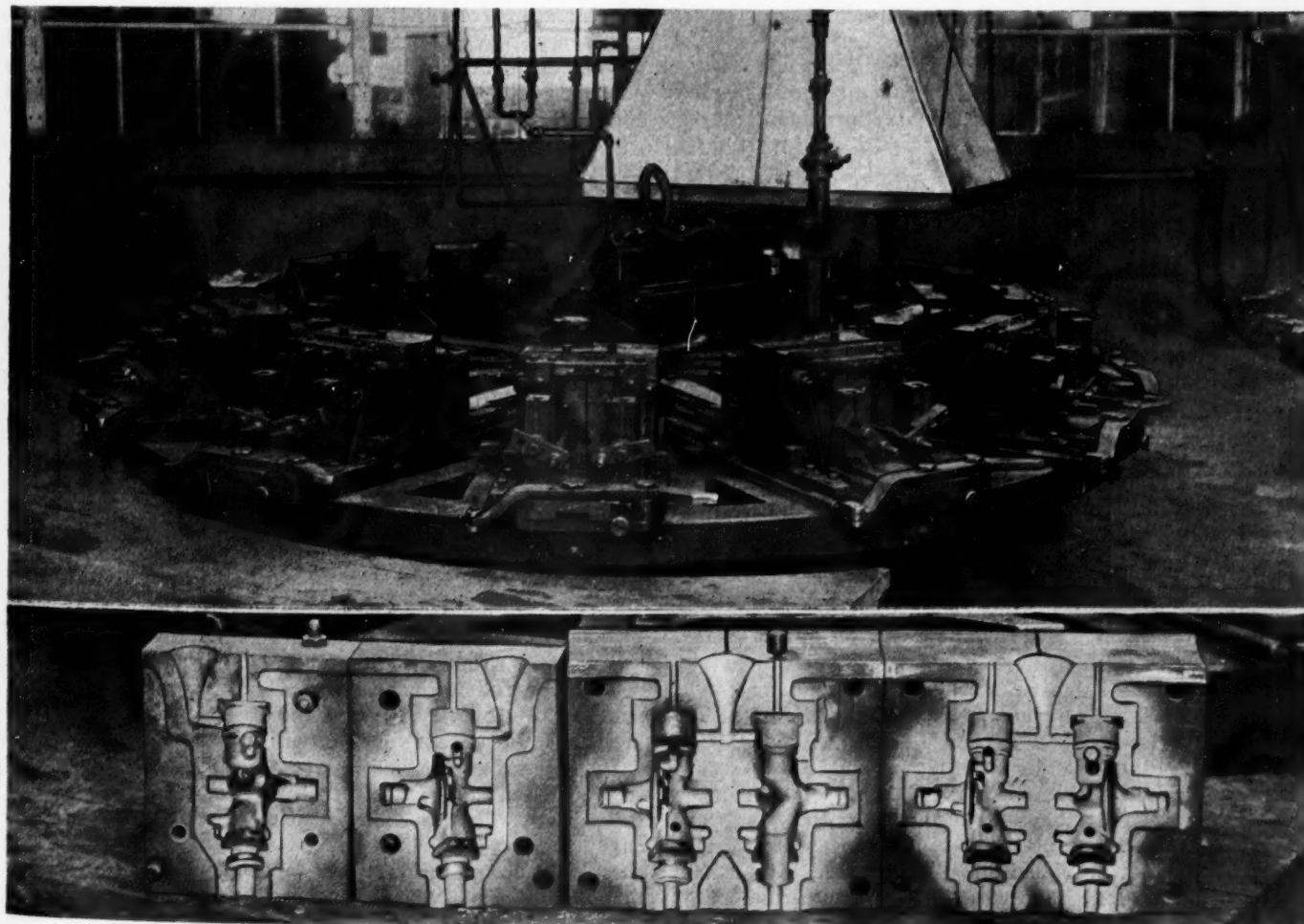


Fig. 10 (bottom)—Molds used in the Holley process which are themselves cast in metal molds instead of being die-sunk. Fig. 11 (top)—Close-up view of one of the molding machines

portion near the gate is subjected to the full force of the entering iron. The molds are then automatically closed and the sequence of operations is repeated.

In this way a 12-headed machine, such as shown in Fig. 11, will produce 2000 castings in five hours, or at the rate of 400 per hour, the labor on these machines being one pourer, one core setter and one laborer. In the case of the vaporizer outlets there is no core and, therefore, only two men are required.

Molds Are Preheated

Before starting the machine in the morning the molds are preheated in order to remove any possibility of moisture which would be positively dangerous with molten iron. In addition the operator inspects the molds and if any portion of the coating needs renewing he applies some of the wash from which the "stone coating" is built up. Incidentally, this wash is simply a mixture of water, powdered fire clay and water glass, and is applied to the mold while the latter is hot, the water thus being driven off, leaving the coating adhering to the mold.

Iron cast by this process is approximately 30 per cent stronger in compression than sand cast iron. Transverse tests on the standard arbitration bar, breaking between 12-in. centers, show a slight increase in strength before normalizing; but normalizing at say 1550 deg. F. for one hour practically doubles the strength without materially changing the structure, as verified by the microscope. My theory is that a slight heat treatment at these temperatures has a tendency to relieve casting strains without altering the constituents and that each particle of graphite is surrounded by a film of ferrite under tension and that normalizing is so beneficial because it releases this tension.

Six Machines in Operation

We have at this time in the Holley plant six 12-headed machines operating five hours per day producing three

distinct types of castings, two with dry sand cores and one without.

These machines produce over 11,000 castings during the pouring period of five hours, or at the rate of approximately 2000 per hour. Only unskilled labor is utilized in this department.

After two years' experience we find that the maintenance cost of die cast machines, molds, etc., is considerably less than the corresponding cost with sand production equipment in sand turning out casting equipment. We have been able to effect a great saving over sand cast molding, and in addition have produced a superior product.

The discussion was chiefly in the nature of questions put to the author and answers by him. It was brought out that the proportion of scrap in connection with the Ford carburetor casting runs between 7 and 8 per cent as compared with about 20 per cent for sand casting, and that the machining scrap is from $2\frac{1}{4}$ to $2\frac{1}{2}$ per cent as compared with 7 to 8 per cent for sand casting.

Cost and Life of Molds

The cost of a master mold, which is made from a wood pattern, is about \$30 and the cost of a pair of the production molds \$8. Ordinarily from 8000 to 10,000 castings can be poured in a set of molds, while as many as 20,000 and 25,000 have been cast in a single pair. The mold coating or "stone facing" is renewed only if iron is poured into a wet mold. The molds are cast of the same iron as is later poured in them.

On cored holes the dimensions can be held within 0.005 in. of the nominal size. Where a straight core is required a metal core can be used. The castings produced have a Brinell hardness of 176-185. Pistons remain in the mold 47 seconds before they are ejected. As regards risks to employees, Mr. Meloche said that whereas they had had serious accidents in the foundry where sand castings were produced, they had had only a case of slight burns in connection with the permanent mold castings.

Production Estimates and Price Changes of Platinum in 1923

THE production of crude platinum in California and Oregon in 1923 was slightly less than in 1922, when 1008 ounces were produced, according to the Department of the Interior, as indicated by estimates made by the Geological Survey.

Reports from Russia indicate that the production of platinum probably increased a little as compared with 1922. The output of Colombia in 1923 was probably about 40,000 ounces. The South American Gold & Platinum Co. operated three dredges, and its hydroelectric installation was practically completed. The British Platinum & Gold Corp. used only one of its boats but made a good output.

In South Africa a new platinum field was investigated by competent engineers, and two companies have been organized to develop the deposits discovered in the Waterbury district of the Transvaal.

Fortunately the domestic stocks of platinum metals at the beginning of 1923 were large, amounting to 41,900 ounces of platinum, 7559 ounces of iridium, and 24,975 ounces of palladium, so that the imports in 1923 were not so great as in 1922. Imports for the first nine months of 1923 indicate that the total receipts for the year were about 70,000 ounces of platinum, 1200 ounces of iridium, and 13,000 ounces of palladium, as compared with 94,939 ounces of platinum, 1899 ounces of iridium, and 9574 ounces of palladium in 1922. Apparently because of the large stocks, the supply of platinum metals available for use in 1923 was nearly equal to that in 1922.

Platinum was quoted at \$110 an ounce at the first of the year and at \$125 an ounce in the closing months, sales during most of the year being made at about \$116 an ounce. Iridium maintained its high price of \$270 to \$300 an ounce, and the price of palladium remained at \$80 an ounce, practically unchanged.

Power Losses Are Reduced in Aircraft Engine Operation

ANEW method for operating aircraft engines without a serious loss of power at high altitudes has been introduced in France. The original plan, as is well known, was to use the Rateau turbo-supercharger, but it is now proposed to design the engine for a very high ratio of compression and use a fuel that will stand such compression without detonation, such as alcohol, for flying at low altitudes, switching to gasoline as soon as a certain altitude is reached. The use of two fuels alternately in the same carburetor, one of which has a materially lower heat value than the other, necessitates special carburetor adjustments, but this problem is now being looked into by the carburetor makers. It is stated that the system here outlined was used by Sadi Lecoq when he established a new altitude record of 35,500 ft. recently.

Excelsior Offers New Eight-in-Line Overhead Valve Engine

Product of Chicago concern resembles four announced several months ago. Has nine-bearing crankshaft, aluminum rods and pistons and high pressure lubricating system. Is reported to develop 93 b.hp. at 2500 r.p.m. Bore is $3\frac{3}{8}$ in. and stroke is $4\frac{1}{2}$ in.

AN eight-in-line engine of the valve-in-head type with valves actuated by an overhead camshaft shortly will be placed on the market by the Excelsior Motor Mfg. and Supply Co. of Chicago. This concern, which is well-known as the manufacturer of Henderson and Excelsior motorcycles, for some time has offered to the automobile trade a four-cylinder overhead camshaft engine. The eight-in-line engine has many of the characteristics of the Excelsior four, particularly as regards the valve mechanism. This eight will be made initially at the plant of the Taft Peirce Mfg. Co., in Woonsocket, R. I., where tooling already is actively under way.

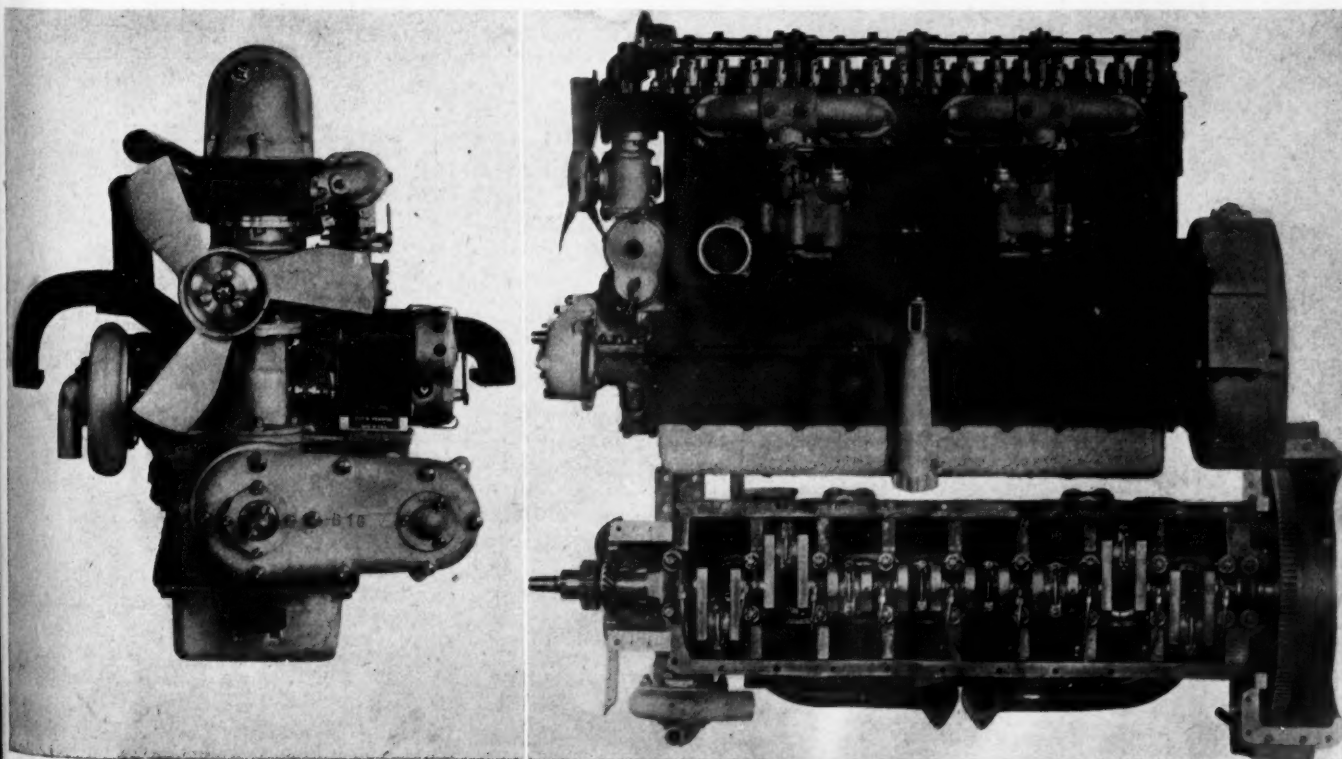
For the present the engine will be made with moderate compression ratios, but, because of the form of the head casting, it is possible to increase the compression by simply planing off more metal from the lower face of the head. With a bore and stroke of $3\frac{3}{8}$ by $4\frac{1}{2}$ in. and a compression ratio of 4.65 to 1, an output of 93 horsepower (average) is secured on the block, at 2500 r.p.m., which is approximately the speed of maximum power. A fuel consumption of .55 lb. per brake hp. hr. is claimed with this output.

Three iron castings with aluminum pan, valve-cover and bellhousing, make up the main structure of the engine. The head is a separate casting, the block and the upper half of the crankcase form the second and the lower half of the crankcase the third.

There are nine main bearings supported in transverse webs in the upper half of the crankcase which is split below the centerline of the crankshaft. Dropping the pan renders all the bearings accessible and accessibility is further promoted by the fact that the pistons can be withdrawn either through top or bottom of the block.

Block of Moderate Length

Overall length from the forward extremity of the fan to the back of the block is 46 in., which is about the same as other engines of this type with approximately the same bore. The block is a little longer than usual because of the $\frac{5}{8}$ in. water space between the cylinders, but the additional length in the block is compensated for by the compactness of the fan drive which is direct by gear instead of by the usual belt. The length of the block itself is 38 in.



Three views of the new eight-in-line $3\frac{3}{8} \times 4\frac{1}{2}$ in. Excelsior engine with nine-bearing crankshaft

Aluminum alloy pistons are employed and when the engine is put in production it is likely that they will be of the split skirt type. Other types are being experimented with, however, and this point is not settled definitely. Pistons are 4 in. long. Pins float and are capped by soft bronze buttons to obviate scored cylinder walls. Forged aluminum alloy connecting rods measuring $9\frac{1}{4}$ in. center to center are used so that the weight of reciprocating parts is minimized. Pressed with the rods are aluminum tubes which act as leads for carrying oil under pressure to the wrist pin bearings.

Lower rod bearings are $2\frac{1}{8}$ in. in diameter by $1\frac{1}{2}$ in. long. The babbit in these bearings is centrifugally cast on a vertical disk grinder. Rod caps are secured by two molybdenum steel bolts. The piston pin bearing is $\frac{7}{8}$ in. in diameter by $1\frac{1}{2}$ in. long and the end main crankshaft bearings are $3\frac{1}{2}$ in. long. The total supported length of the shaft is $17\frac{1}{2}$ in. and the shaft is 38 in. between centers of the end bearings. The shaft is $3\frac{1}{2}$ per cent nickel steel with 0.35 to 0.45 per cent carbon content.

A spiral bevel gear train drives the camshaft and, by means of a cross shaft, the magneto and water pump. The spiral bevel pinion on the end of the crankshaft is outboard, engaging on the forward side of the gear which drives the vertical shafts. The upper vertical shaft carries near its upper end a spiral bevel pinion, which engages with a bevel gear on the front end of the overhead camshaft.

A plain bronze pilot bearing intended to steady the upper end of the vertical shaft is formed in a bracket held by cap screws to the forward end of the head casting.

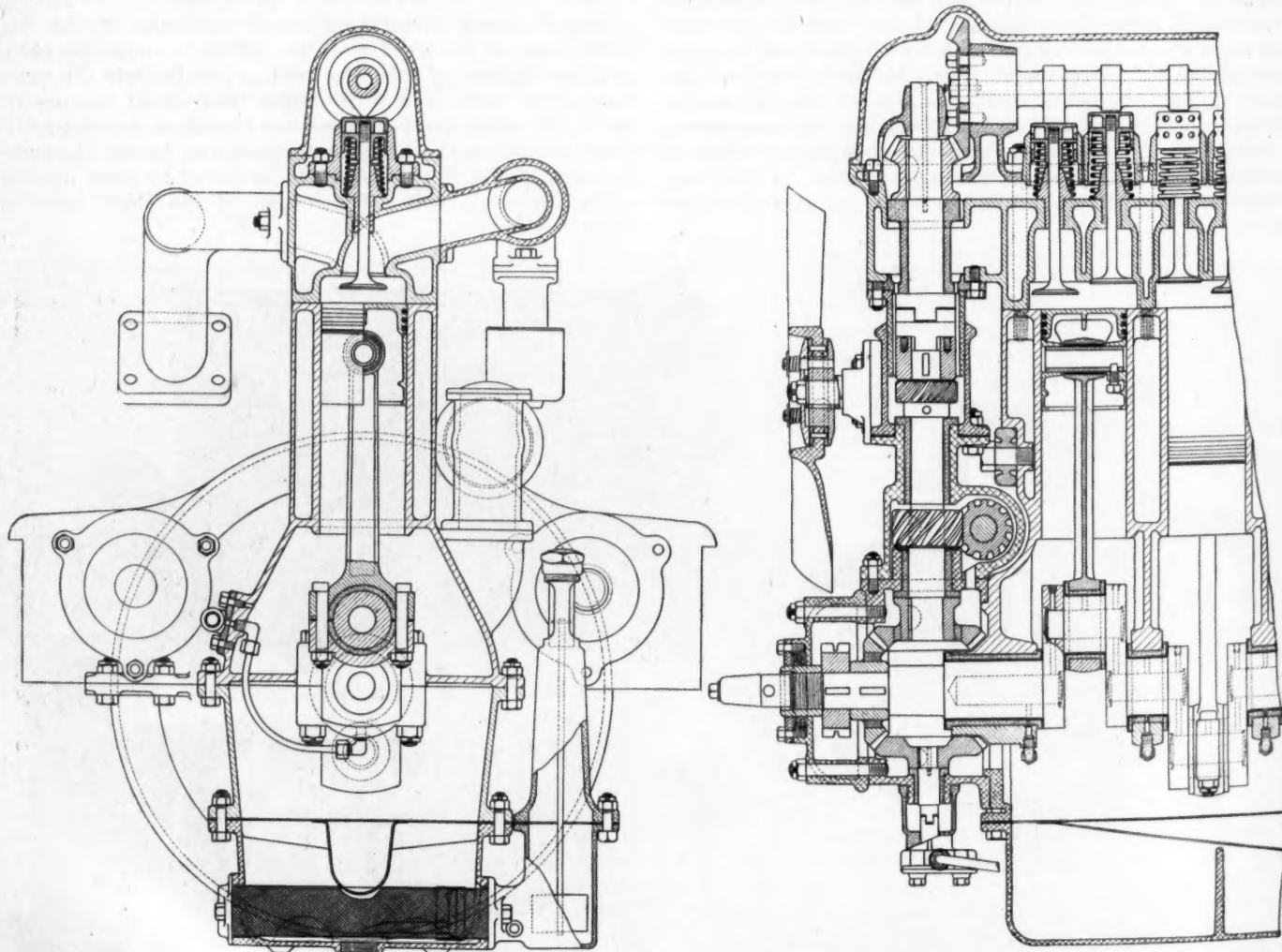
The upper part of the vertical shaft lifts off with the head, separating from the lower part of the vertical shaft at an Oldham coupling located just above the helical gear which drives the fan shaft. The fan itself is driven by a small friction clutch.

Another helical gear mounted on the vertical shaft between the fan shaft gear and the crankshaft drives the transverse accessory shaft. The latter drives the water pump on the right side and the magneto or distributor on the left side. The generator is mounted on the left side and is driven by chain off a sprocket on the end of the crankshaft. A flange type of mounting is used for the generator.

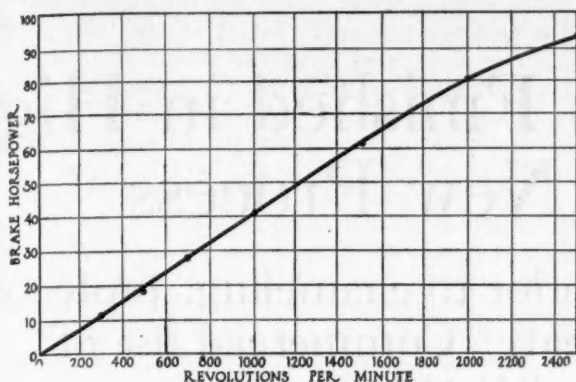
Arrangement of Valves

Valves are mounted in the head immediately under the camshaft and are operated directly by the cams without rocker arms. A valve guide in the form of a small trunk piston into which the valve stem is screwed takes the side thrust of the cam. This design is claimed to reduce wear and minimize leakage between the valve stem and its guide. A hardened steel disk screwed on the valve stem on top of the piston acts as a lock nut and also as the cam follower. The piston and the lock nut are provided with peripheral holes for the insertion of pins by means of which clearance adjustment between the cam and follower are made.

The valves are of A. E. S. material, made by the Rick Company. They have a clear diameter of $19/16$ in. at the port opening. They are tulip form and are closed by 76 lb. conical springs. The firing order is 1-6-3-5-8-2-7-4. Valves



Transverse and longitudinal sections of new Excelsior eight-in-line engine



Horsepower-speed curve of Excelsior eight-in-line plotted from data furnished by manufacturer

are timed to give a zero lap. Intake opens at 8 deg. past upper center and closes 45 deg. past lower center. Exhaust opens 45 deg. before bottom center and closes 8 deg. past upper center.

Pressure in the lubricating system varies from 10 lb. per sq. in. at idling up to 75 lb. at high speeds. Oil lines are exterior and the pressure is carried through the camshaft as well as to the crankshaft and rod bearings.

Surplus oil from the camshaft is returned to the sump through the casing surrounding the vertical shaft and gears, thus furnishing lubrication for the gears and bearings.

A patented oil retarder located in the camshaft is designed to allow an ample supply of oil to pass to the mushrooms and valve guides but to prevent an excessive amount reaching these parts and finally entering the combustion chamber. The oil pump is a gear type driven off a short vertical shaft by the same spiral bevel pinion that drives the upper vertical shaft. The pump is detachable from below and is readily accessible.

The engine is made for either one or two carbureters. Very good results have been obtained with two carbureters, each taking care of a group of four cylinders. In this way the intake leads are kept short and the characteristics of each manifold can be made quite similar. A small tube, not shown in the illustrations herewith, connecting the two intake manifolds has been found to be of benefit in idling. The gas speeds are kept low due to the large ports and valves, and a high volumetric efficiency is claimed throughout the entire speed range.

In a test run with two Zenith carbureters, the data used in plotting the accompanying power-speed curve were secured.

Brown & Sharpe No. 2-I Universal Grinding Machine

BBROWN & SHARPE MFG. CO. of Providence, R. I., are now manufacturing a new universal grinding machine of the constant speed drive type, known as the No. 2-I. The new machine has a constant speed self-contained drive and embodies such features of the B & S line of plain grinding machines as the independent automatic cross feed, quick traverse of wheel slide, and all-gear change speed and feed mechanisms. The automatic lubrication of the various operating mechanisms is new.

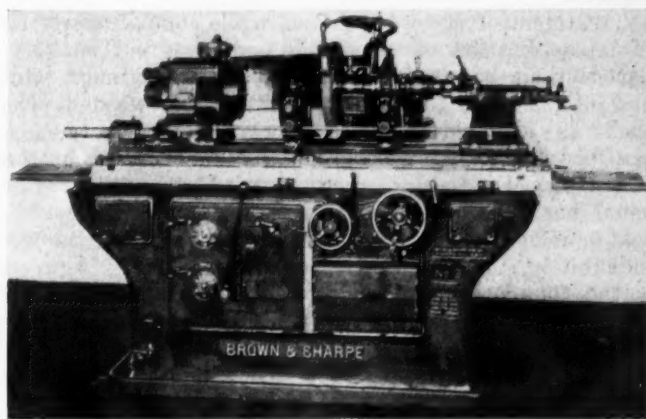
The convenience with which the machine can be operated is evident from the illustration, which shows the centralization of all control and operating levers. The table and work are controlled by the hand lever shown slightly to the left of the center of the illustration. The same lever also actuates a brake for stopping the table and work. The various other controls are placed conveniently at the right and left of the operator.

Work up to 14 in. in diameter by 36 in. in length can be handled in the machine, which swings up to 12½ in. diameter over the water guards.

The constant speed self-contained drive consists of a single pulley of 8½ in. diameter for a 4½ in. belt, protected by a heavy belt guard. The driving shaft runs on ball bearings at a constant speed of 900 r.p.m. Provision is made for a motor drive, and when so arranged, the motor is fastened to the floor and drives the pulley through a belt.

At the rear of the machine on the main driving shaft is a wheel driving pulley, the face of which is made sufficiently wide to permit the travel of a belt, compensating for the varying position of the wheel slide. From this pulley the grinding wheel spindle is driven by a belt running over horizontal idlers, mounted on roller bearings carried in a swinging frame, and vertical idlers mounted on the wheel stand. The swinging frame, automatically provides for keeping an even tension on the belt, regardless of the position of the wheel spindle. An adjustment is also provided to take care of the stretch of the belt and the split pulleys of different diameters, used to obtain the various wheel speeds.

A feature of considerable importance is that of the automatic lubrication of all operating mechanisms. An oil tank and pump, contained within the base, furnish a constant supply of lubricant, which is conveyed by means of pipes directly to the various units of mechanism. This system subjects the operating mechanisms to a constant deluge of oil, which, after passing over the mechanism, is returned to the tank. Bearings not automatically lubricated are provided with sight feed oilers or grease cups. The oil is automatically shut off when the table operating mechanism is not in operation.



Brown & Sharpe No. 2-I universal grinding machine

THAT hardness and brittleness in steel are not necessarily proportional properties is shown by the following: Pieces of air-hardening steel after water-hardening, oil-hardening and air-hardening may be equally hard but they are not equally brittle nor are they stressed to the same extent. The chances are the water-hardened specimen would fracture before it had cooled down, the oil-hardened specimens would be apt to develop cracks from what appear to be insignificant surface defects, whereas the air-hardened specimen would be sound.

Wood Framed Bodies Finished in High Bake Enamel by New Process

Special coating, placed on frame prior to enameling, protects wood members from intense heat. Commercial use of Chinawood oil makes possible this method.

By W. L. Carver

METAL automobile bodies having wood frames now are being finished commercially in true high temperature baked enamel by the Oxvar system which is the product of the Oxford Varnish Corporation of Detroit. The vital feature of this process is a protective coating which is baked onto the assembled frame or if necessary, to its component parts prior to the application of the raw metal panels and the enameling process which follows. By this coating, which is based upon the most recent developments of the commercial utilization of Chinawood or Tung oil, the wood members are sealed and remain unharmed by the high temperatures of the enameling process, changes of humidity or subsequent atmospheric or temperature changes when in the owner's hand.

Development of this process has been carried on and perfected by the engineering plant and organization which was responsible for the enameling process which had its first application to fenders and similar parts about fourteen years ago. From the enameling side, process and materials have gone through a great advance so that a great distinction now exists between the character of the finish as applied to bodies and that which is usually applied to fenders.

Treatment of the wood frame, while comparatively new in its application to automobile bodies, is not entirely a new method, but is based on the baking treatment which has been applied for many years to small wooden pieces such as the old-fashioned stocking darning, penholders, handles for kitchenware and even overcoat buttons. When properly treated, these pieces had a finish of unusual hardness which was unaffected by ordinary heat, cold or moisture and maintained the structure of the wood indefinitely. The application or extension of this process is the foundation for the present system of giving the wood body frame an impervious shell before the enameling process.

Little Change in Routine

In the body building routine, no change in method is required prior to the treating process. Parts are formed as usual and are glued and screwed together. In view of the subsequent treatment and enameling heats, however, ordinary air drying glues must be replaced by high temperature glues. When the body frame is completely assembled it is ready for the Oxvar preliminary treatment which consists of immersion in a dipping tank and a subsequent baking process. If expedient, component parts of the frame may be dipped separately, but in the end every portion of the wood surface should be thoroughly coated.

Chinawood oil, gilsonite, which is a high grade asphaltum, and pigment are some of the chief ingredients of the pre-treating solution. Chinawood oil which is the

foundation of all spar varnishes is highly viscous and under the influence of heat and a liberal supply of oxygen forms a hard, durable coat. Gilsonite is one of the important bases of so-called asphaltic enamels and is also capable of being treated at comparatively high temperatures with no deterioration. Pigments are used merely to insure the black color which is characteristic of frames treated by this process. This fluid may be brushed on if dipping facilities are not readily available, but the sealing effect is lessened slightly due to the lack of uniformity of coating.

Frame Baked Four Hours

Following a brief draining period, the frame, or its component parts, is baked for four hours at a maximum temperature of 250 deg. Fahr. During this process, it is necessary that the temperature be increased gradually from atmospheric so that the protective coating will harden before the moisture in the wood tends to escape. After maximum heat is attained under these conditions, the frame is allowed to cool back to atmospheric temperature and then is ready for the application of the metal and the enameling process.

This preliminary treatment leaves the frame in a stable condition which is comparatively unaffected by heat or moisture. Problems of warpage and splitting which accompany slushing of the wood frames do not enter into any of the subsequent operations or in use by the owner.

Slushing as ordinarily performed has but little chance of adding any protective feature to the wood frames. In the first place, the material used is a rather inexpensive form of asphaltum paint which is soluble in gasoline. This material is brushed on hastily by a helper and if it does not brush readily, more thinner or solvent is added so that the resultant coating varies materially and consists largely of a little pigment and a lot of thinner.

In many plants the pour-back from the enameling tanks are added to the slushing fluid with the apparent idea of utilizing a waste product. However, this practice, it is stated by Oxford engineers, really amounts to adding the waste from rather expensive material to a cheap material when it is possible to conserve the so-called waste for its original purpose. Furthermore, if this material really has reached the waste stage, it must contain a high ratio of impurities and dirt and therefore will be of little or no value as a slushing compound. Regarding brushing as compared to dipping, a report of the Forest Products Laboratory states, "Slightly greater moisture resistance is obtained where this method (dipping) is used than by brushing. This is due, probably, to the greater uniformity of the coating."

In the consideration of any type of protective coating for wood, the question of moisture content sooner or later

will become the major factor. Various standards of moisture content have been advanced from time to time, but apparently no agreement has been reached. However, the latest theory, which has been checked by a thorough investigation, seems to indicate that as long as the content does not vary materially in actual use, the specified ratio of moisture content is a factor of less importance. This statement naturally is predicated upon a moisture content figure of a reasonable amount. It is the change of moisture content with attendant warping and swelling which is responsible for failures rather than the actual percentage. If the ratio is fairly fixed, the properties of the particular wood may be determined and stresses regulated accordingly.

Forest Products Laboratory Report

A report from the Forest Products Laboratory relating to moisture-resistant coatings for wood states this problem as follows: "Shrinking and swelling and internal stresses causing warping and checking are brought about in wood by changes in the moisture content. Such changes are occurring constantly when wood is exposed to changing atmospheric conditions and the only way to prevent or retard them is to protect the wood from the air with some moisture-resistant finish or coating."

This statement is included as part of a report which tabulates several methods of finishing with the moisture-resistant properties calculated in percentage of efficiency, as follows:

Treatment	Percentage Efficiency
Aluminum leaf process-asphalt paint base...	98
Three coats spar varnish coated with vaseline	98
Three coats of asphalt paint.....	96
Aluminum leaf process—spar varnish base...	95
Aluminum leaf process—cellulose lacquer base	94
Aluminum leaf process—oil paint base.....	93
Three coats of aluminum bronze (quick drying)	92
Heavy coating of paraffine	91
Three coats of rubbing varnish	89
Three coats of enamel	88
Three coats of orange shellac	87
Three coats of cellulose lacquer.....	73
Sheet pyralin .005 in. thick glued to wood...	68
Three coats of graphite paint	61
Three coats of spar varnish.....	60
Three coats of white lead oil.....	54
Five coats linseed oil applied hot and two coats of wax	38
No coating	00

Aluminum Leaf Process

Obviously the aluminum leaf process, which consists of coating the surface with thin metallic leaf in conjunction with a binder of asphalt paint or varnish, is not a commercial process when body manufacture is considered. This is the treatment which is applied to many airplane propellers, but the expense is great and its application to body parts is not feasible. It will be noted that the bases of the next two processes are similar to these of the Oxvar preliminary treatment. All spar varnishes contain varying proportions of chinawood oil and the best grade of asphalt is gilsonite. Also the treatment which was accorded these specimens in the Forest Products Laboratories did not include any heating or baking provisions.

Chinawood oil has received considerable attention recently, chiefly due to its characteristic of forming a hard durable shell when exposed to the atmosphere. Laboratory research and commercial usage has demonstrated that this characteristic is enhanced and accelerated when modern type ventilated ovens are used for drying purposes. Unlike linseed oil, chinawood oil is not broken down but its properties are fully developed by the high temperatures of the

usual oven equipment. Gilsonite, which is one of the bases of the best asphalt enamels, has the same characteristic.

With the element of heat added, it is stated that the results of the Oxford preliminary treatment are comparable to the best results obtained in this series of tests. While the moisture content of the wood is reduced by this treatment it is also fixed and therefore a definite modulus can be assigned to any particular wood. This statement is borne out by the experience of one prominent car manufacturer who has used the process for nearly three years. The frames pass through the pre-treating process, enameling and road usage in a consistent manner and a high standard is maintained. Although moderately priced, these bodies are to a large extent free from troublesome squeaks and doors fit accurately and quietly after long periods of service. In addition to this experience, several other manufacturers have had test cars on the road for a year or more with similar results.

From the laboratory side, a series of tests bear out the performance in the owners' hands. Recently, comparative tests were made of two samples, one of which was untreated bare wood and the other of which had been given preliminary treatment in accordance with the routine outlined previously. These samples were subjected to intermittent heats ranging from 120-140 deg. Fahr. for a period of 50 hrs. The temperatures were selected as being about the maximum to which the automobile body is subjected in service. At the end of the test, the treated sample showed a 0.49 per cent loss of weight, while the figure for the untreated sample was 9.26 per cent. Results comparable to these have been obtained when the process was reversed and the specimens were exposed to a saturated atmosphere instead of being heated.

Results of another test made at the Detroit Testing Laboratory are digested as follows:

Laboratory Test Results

The purpose of this investigation was to secure data as to the effect of the Oxvar preliminary treatment and enameling heats on the strength of various woods. In addition, tests were made of moisture contents and deflection in bending of woods submitted to various conditions.

Particular attention was paid to the moisture contents of the wood so that pieces of average moisture could be selected. Three woods were used—maple, birch and white ash—and pieces were finished to 1 in. x 2 in. x 14 in. Three samples of each wood were submitted to static bending tests to ascertain the strength before treatment.

Three samples of each wood were given the Oxvar wood frame cement dip and heat, and then successive enamel dips and heats, and then were tested for strength and moisture.

Three samples from each wood were placed in the oven with the woods being treated, and were subjected to the four heats without treatment. These samples were then tested for strength and moisture.

Records of heats are as follows:

1. Pieces dipped in wood frame cement—not thinned. Drain five min. Heated uniformly from room temperature to 200 deg. Fahr. Time 4 hr.
2. Pieces dipped in semi-luster-low bake enamel, thinned to 32 deg. Baumé. Drained 5 min. Heated evenly from room temperature to 400 deg. Fahr. in 1 hr. and then cooled.
3. Pieces dipped in full luster-low bake body finish enamel thinned to 32 deg. Baumé. Drained 5 min. Heated evenly from room temperature to 400 deg. Fahr. in 1 hr. and then cooled.
4. Pieces dipped in full luster-low bake body finish enamel thinned to 32 deg. Baumé. Drained 5 min. Heated evenly from room temperature to 400 deg. Fahr. in 1 hr. and then cooled.

At the time these heats were being made three untreated pieces of each wood were placed in the oven and subjected to the same conditions of heating as the pieces which had been dipped.

RESULT OF STATIC BENDING TESTS

Maple—

No Treatment			Oxvar Treatment			4 Heats—No Dip		
No.	Lb.	Deflection	No.	Lb.	Deflection	No.	Lb.	Deflection
1	2,970	.20 in.	1	3,405	.26 in.	1	3,240	.22 in.
2	3,530	.26 in.	2	3,580	.23 in.	2	3,505	.21 in.
3	3,420	.26 in.	3	3,980	.30 in.	3	3,605	.23 in.
Av.	3,306	.24 in.	Av.	3,655	.26 in.	Av.	3,450	.22 in.

Birch —

No Treatment			Oxvar Treatment			Load		
No.	Lb.	Deflection	No.	Lb.	Deflection	No.	Lb.	Deflection
1	3,550	.26 in.	1	2,960	.21 in.	1	3,320	.23 in.
2	2,750	.33 in.	2	3,340	.22 in.	2	3,330	.21 in.
3	3,295	.31 in.	Av.	3,442	.225 in.	Av.	3,413	.22 in.
Av.	3,198	.30 in.	Av.	3,442	.225 in.	Av.	3,413	.22 in.

Ash—

No Treatment			Oxvar Treatment			Load		
No.	Lb.	Deflection	No.	Lb.	Deflection	No.	Lb.	Deflection
1	2,030	.26 in.	1	2,580	.25 in.	1	2,360	.21 in.
2	2,080	.29 in.	2	2,480	.24 in.	2	2,720	.22 in.
3	1,890	.29 in.	3	2,340	.21 in.	3	2,005	.22 in.
Av.	2,000	.28 in.	Av.	2,467	.233 in.	Av.	2,361	.216 in.

Moisture tests run on the various samples resulted as follows:

Maple —	Untreated	7.10 per cent
	Oxvar treatment	2.86 per cent
	4 heats—no dip	1.84 per cent
Birch —	Untreated	8.73 per cent
	Oxvar treatment	2.92 per cent
	4 heats—no dip	0.43 per cent
Ash —	Untreated	10.70 per cent
	Oxvar treatment	2.25 per cent
	4 heats—no dip	1.21 per cent

The tests as conducted were more severe on the woods than would be the case if full size body parts had been used, since the ratio between surface and cubic contents changes materially. In the large pieces, the heat would penetrate more slowly and the moisture in the center portions would have further to travel, so one might expect that the pores would be more thoroughly sealed in the treating process, retaining a larger portion of moisture than the smaller pieces. As previously stated, it is believed that one of the important features of the process, regardless of moisture content, is the sealing of the pores to prevent any subsequent swelling or warping of the wood through absorption of moisture by the treated parts.

It will be noted that in spite of the reduction of moisture content, the strength has been generally increased by the treatment. With one exception, the deflection is slightly reduced, indicating an increase in stiffness. The parts subjected to heat with no treatment sustain loads somewhat larger than the originals with a further decrease in deflection, as compared to the original samples, being somewhat nearer a brittle condition.

In the enameling process which follows the treatment, equipment and methods are conventional and heats are carried to approximately the conditions indicated in the excerpt from the laboratory process. Three coats usually are applied, although the condition of the metal has some bearing on this number. One of the manufacturers now using this material originally applied five coats of enamel, but this was later reduced to three, with every evidence of commercial perfection. From the original fender enamel

which has been developed to its present state, body enamel also has been developed, until it is now an entirely separate material.

It is stated that the term asphalt enamel is a misnomer, since asphalt is the base of the cheapest kinds of paint, which have no rust- and but little weather-proofing ability. Ordinary asphalt paint which is applied to structural steel for shipment is a sample of this material. Its use for iron poles, dock fittings, etc., is rapidly being discarded. Most of the better grade automobile body enamels contain asphalt in its highest form, which is gilsonite. This material resembles lump coal in appearance, is mined in a somewhat similar manner, and the better grades provide a great portion of the jet black color which is characteristic of black baking enamel.

This material is far removed from the lower grades of asphalt and is mixed with palm oil pitch, perilla oil and others to produce present day enamel. In most cases, enamels of this type can be thinned with petroleum products such as gasoline, but this characteristic depends upon the nature of the treatment and blending while in the process of preparation.

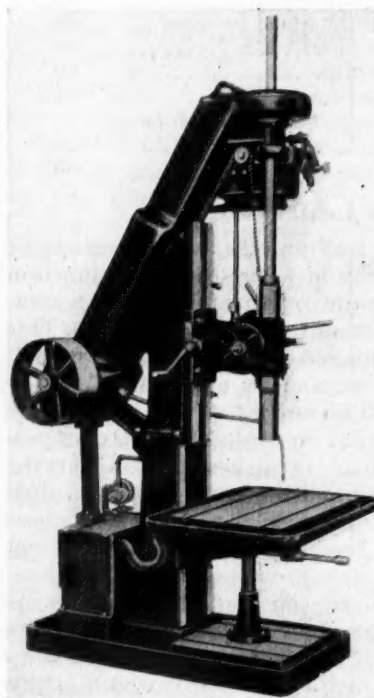
Barnes Develops All-Geared Drill

ADVANCED practice in machine tool design is claimed to be embodied in the No. 263 sliding head, self-oiled, all-geared drill and tapper of the Barnes Drill Co. of Rockford, Ill. It has annular ball bearings for all shafts in the speed change gear, including the crown gear and drive shaft bearings. The drill is furnished either with a square table and rectangular column as shown, or with round table and column if preferred.

This machine takes the place of the 26-in. sliding head, all-geared drill, but the ball-bearing and self-oiling features have been added, as well as the following novel features. A spur gear feed in place of the usual worm and wheel feed, giving a minimum feed of 0.005 in. per revolution of the spindle; dovetailing the rack into the sleeve

and keying same to take end thrust, which is claimed to obviate trouble from working loose of the rack that occurs with the ordinary fastening method of screwing and dowsing; eight changes of geared speeds and geared feeds, obtained without stopping the machine.

The No. 263 machine is claimed to handle high speed twist drills up to 2½ in. at suitable speeds and feeds and to successfully bore cylinders up to 8¼ in. in diameter. Some of the first of these drills put out have been in service for months drilling 1¼ in. holes 5 in. deep in automobile forgings and other pieces of similar character.



Barnes Drill Company's No. 263 drill with ball bearings and spur gear speed changes and feeds

Here and There in Foreign Markets

Courtesy Automotive Division, Bureau of Foreign and Domestic Commerce

Buses Take Taxi Business in Chile



RAPID expansion into auto bus service in Chile has materially affected the operation of taxicabs, says Assistant Trade Commissioner C. C. Brooks in a report to the Department of Commerce. Although two years ago the motor bus was practically unknown in Santiago, Chile, the number of buses now registered in the local license office is 419; of this number 378 are American made.

The popularity of buses is forcing the owners of "for hire" automobiles to place their business on a competitive basis or to withdraw their machines from circulation. In their efforts to accomplish the former they have petitioned for the authorization of a standard schedule of fares based on distance and the approval of the use of taximeters. As there are practically no meters available at this time the use of these recording devices is optional, but there is every likelihood that when meters can be obtained in quantity their use will be made obligatory.

Judging from the number of public motor vehicles in operation the market should absorb about 1500 meters at the maximum. Most dealers are uncertain as to just what share of the total business each will obtain and they, therefore, propose to sell the meters instead of rent them as is the custom in some of the larger cities of Latin America.

This will place the problem of maintenance and repair in inexperienced hands and will probably be the source of considerable complaint and dissatisfaction. If a single company undertook to place meters on a rental basis, guaranteeing upkeep, it probably could secure the bulk of the business and at the same time be assured of a continuous profit instead of the initial one produced by direct sale.

Use of Trucks Widens in France

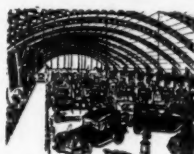


THE variety of uses to which buses and trucks are being put in France is increasing steadily, Consul H. H. Watson, Lyon, reports. A company now constructing a large plant for the manufacture of artificial silk six kilometers from Lyon, for instance, expects to place an order for 18 buses to take its workers to and from the plant. An automobile plant seven kilometers from Lyon already has inaugurated a similar service for its office staff.

Such conditions are growing more prevalent as large industries establish themselves in greater numbers outside the limits of the cities. For this reason, among others, automobile manufacturers predict a rapid improvement and growth in transportation by gasoline driven cars both for merchan-

dise and for passengers. The 500-kilogram truck seems popular, although those weighing up to 2000 kilograms also are in demand.

Australia Plans All-British Show



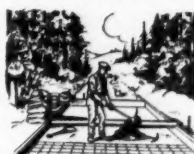
PLANs are being made to hold a purely British motor show in the Exhibition Building, Melbourne, Australia, during July, 1924, Trade Commissioner J. W. Sanger, Melbourne, reports to the Department of Commerce. Forty-two manufacturers will participate in the display, which will cover the whole range of passenger cars, commercial vehicles and heavy transport vehicles. It will be the first and most comprehensive exhibition of exclusively British automobiles held outside the United Kingdom. This would indicate that Great Britain is realizing the importance of Australia as an automobile market. Importations into Australia from the United Kingdom are small in comparison with those from the United States and Canada, which make up 76 per cent of the total.

Sales Prospects Good in South Africa



CARS and trucks sold in South Africa during 1923 were double the sales of 1922, while accessories distribution increased by approximately 50 per cent. Although complete statistics are not available, it is estimated that automotive imports during 1923 reached a total of 9750 passenger cars valued at approximately £1,575,000 and 250 trucks valued at £85,000. The automotive trade in South Africa now appears to be established on sound and conservative lines and with favorable local economic conditions a large measure of prosperity is anticipated this year, says William E. Vaughan, secretary to the Trade Commissioner in Johannesburg.

Norwegian Market Is Improving



ADVERSE conditions which have militated against the Norwegian automobile market are gradually improving and it is certain that automobile transportation will become cheaper and more widely utilized. Much, of course, is being done to improve the roads and difficulties attending winter travel are being lessened through methods of snow removal work and the use of specially adapted vehicles. Growth of automobile traffic during the winter months has been especially noticeable in and about Christiania in spite of the great amount of snow, says Consul General A. G. Snyder.

Tests Indicate Greater Rolling Resistance for Balloon Tires

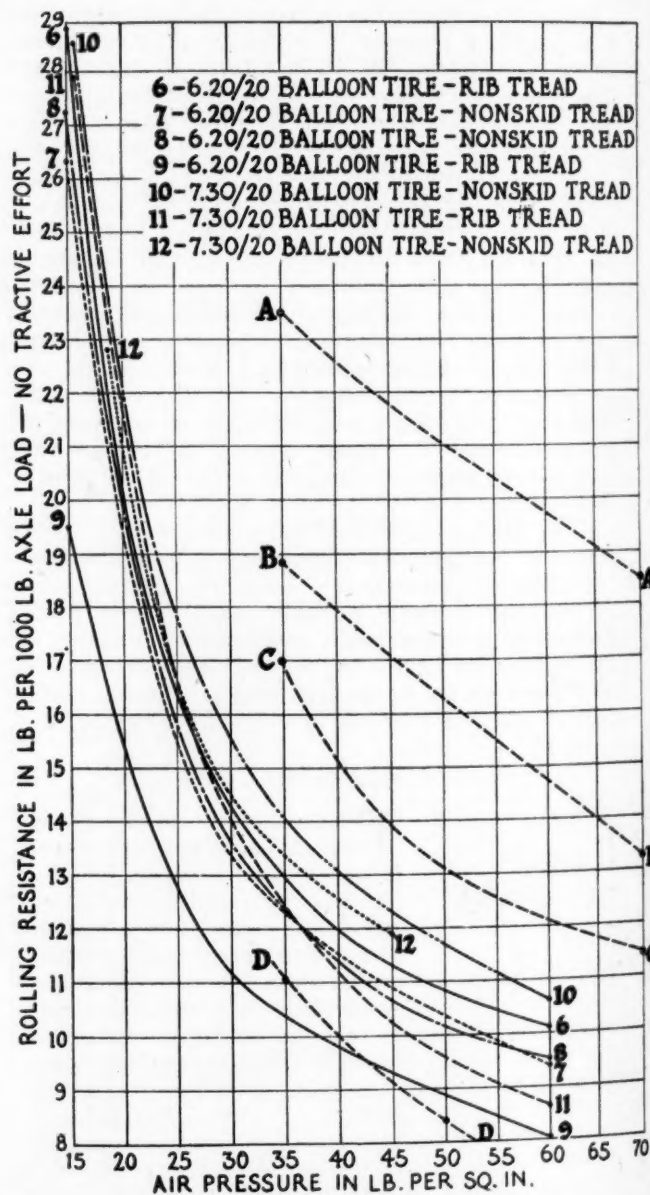
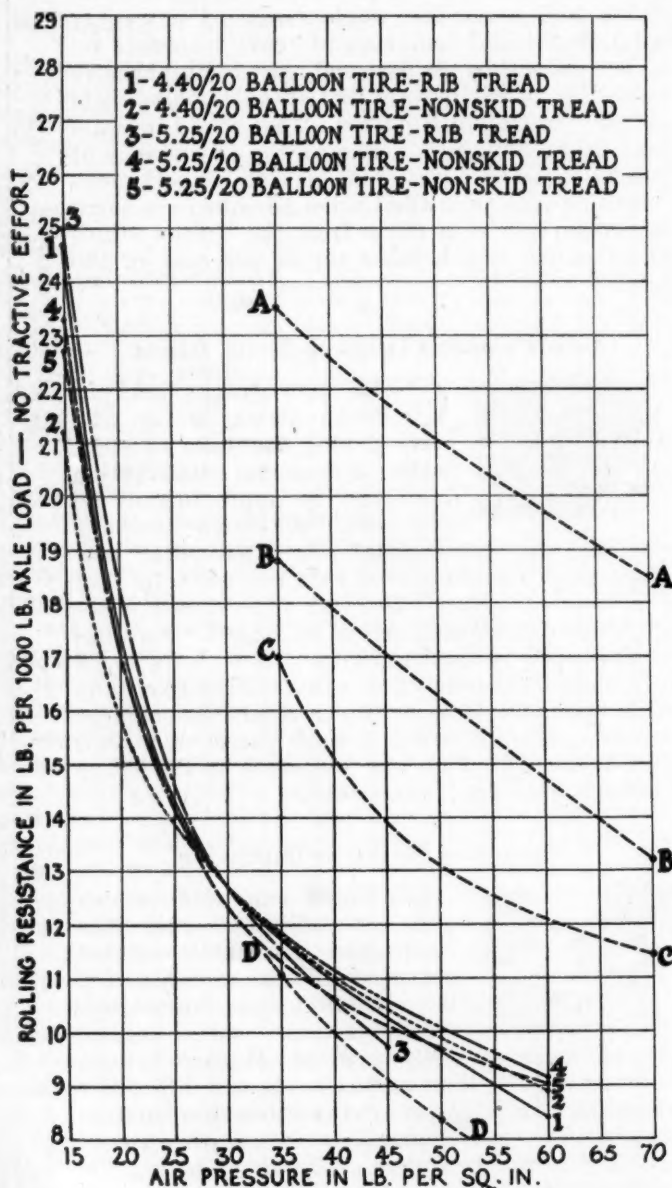
ACCORDING to tests conducted recently at the Bureau of Standards, balloon tires have a higher rolling resistance than ordinary cord tires when inflated to the lower pressures at which they are intended to operate. At equal inflation pressures balloon tires show a slightly lower resistance than the ordinary cord type but when the pressure in the balloon tire is decreased to the value at which the tire is intended to be operated, its rolling resistance and consequent power consumption increases to figures materially higher than those for ordinary cord tires operated at the pressures for which they are designed.

For example, the average rolling resistance per 1,000 lb. axle load of an ordinary cord tire inflated to 45 lb. per sq. in. pressure is about 11.5 lb., while for a balloon tire it

averages about 13.3 lb. at 30 lb. inflation, 15.2 lb. at 25 lb. inflation and 18.9 lb. at 20 lb. inflation.

The relation between rolling resistance of balloon tires and their inflation pressure is shown by the curves in the accompanying figure. The dotted lines C-C and D-D represent the range of rolling resistance of ordinary cord tires. That is, practically all ordinary cord tires will have a rolling resistance somewhere between the limits marked by these lines. Similarly the rolling resistance range of fabric tires is indicated by the dotted lines A-A and B-B.

All of the balloon tires used in the tests for which data here are given were run on a 29 x 4½ in. rim. In each case the normal load for the particular size of the tire was carried by the tire and this load was kept constant during the test.



Comparative rolling resistance of balloon and other tires. Curves plotted from data secured by Bureau of Standards. Dotted lines C-C and D-D represent the range of rolling resistance of ordinary cord tires. Lines A-A and B-B represent the range of rolling resistance of fabric tires. Most balloon tires are intended for inflation pressures of 20 to 30 lb. At these pressures, it will be noted, their rolling resistance is greater than that of higher pressure cords when the latter are inflated to the pressure for which they are designed

Both tire and automobile engineers have held more or less conflicting views in respect to the power losses in balloon tires as compared to ordinary cord tires. Representatives of the Firestone company are emphatic in their statements to the effect that cars fitted with balloon tires consume less gasoline than do cars fitted with ordinary cord tires. This would seem to give the impression that the rolling resistance is less.

Other tire makers admit that the rolling resistance of

the balloon tire is greater, but contend that its effect is not to increase fuel consumption for the reason that less energy is expended in imparting motion to the body of the car through the springs, due to the fact that the tire itself "absorbs" a much larger percentage of road irregularities than do tires inflated to higher pressures.

The accompanying curves are the first to be published giving data on balloon tire losses. The Bureau of Standards is to be thanked for this contribution

Rate of Cooling Determines Hardness of Alloy

RATE of cooling rather than pouring temperature determines the hardness of ternary bearing metal alloys, according to Dr. Ludwig Kaul who recently has completed researches into the structure of these alloys. Results of his experiments are discussed in *Allgemeine Automobil Zeitung*. If the rate of cooling is high, Dr. Kaul found, the alloy will be much harder than if it is low.

This conclusion is confirmed by experiments which have to do neither with alloys nor metals. In the electric furnace silicon may be melted at slightly above 5400 deg. Fahr. If it is cooled suddenly, sand will precipitate, irrespective of whether the material worked upon was sand or the beautiful octahedra of crystallized silicon. Sand is the visible expression of brittleness and hardness—in a certain sense the extreme of both, because as a result of this extreme brittleness and hardness there is no longer any cohesion of the molecules. If the fused mass is cooled slowly, octahedra are again produced.

This experiment furnishes proof positive that it is not the pouring temperature which determines the mechanical property of hardness but the rate of cooling. For sand and silicon crystals are chemically the same thing, and whether one or the other is subjected to the necessary high temperature to fuse it, there is obtained from the sand, according to the rate of cooling either sand or octahedra, and from the octahedra, either sand or large octahedra. It would hardly be possible to show more emphatically that slow cooling alone permits the formation of large crystals and that these are the cause of a low degree of hardness.

Pouring Temperatures

Dr. Kaul endeavored to find out why tin-antimony-copper alloys show different crystalline structures when poured at different temperatures. When pouring at 930 deg. Fahr. large tin-antimony cubes are formed, while at 750 deg. the cubes are smaller. Even though, in accordance with the foregoing, the pouring temperature in itself does not determine the hardness, it is obvious that it affects the possibility of the formation of smaller or larger molecular aggregates. A higher pouring temperature breaks up the molecular aggregates further, and if carried high enough, even to individual molecules, whereas a lower pouring temperature permits them to remain in pairs.

Owing to the breaking up of the molecular aggregates at the higher temperatures, the elements of the alloy are enabled to rearrange themselves during slow cooling and to form the large cubes of the tin-antimony alloy, whereas with a low pouring temperature, slow cooling never gives large cubes. Italian experiments along this line are particularly instructive. The chief lesson of these experiments may be stated as follows:

First, a high pouring temperature in order to break up the molecular aggregates into individual molecules; then rapid cooling in order to obtain a fine-grained structure.

A high pouring temperature is essential to a uniform structure, for with a low pouring temperature the individual molecular state has not been attained by all of the elements, so that upon rapid cooling one part of the bearing metal may consist of a combination of individual molecules of elements 1 and 2, while another part may consist of combinations of individual molecules of element 1 or 2 with pairs of molecules of element 3. These pairs of molecules are found in the copper-tin content. Copper, owing to its much higher melting temperature, remains in the state of paired molecules long after the tin and antimony have reached the state of individual molecules.

Alloy Structure

As regards the structure of lead alloys, micro-analysis has shown that the molecules are arranged in longitudinal layers and that the lead molecule itself is of elongated form. In this respect it is very similar to the mercury molecule, which is even slightly more elongated. Closely similar to the lead molecule in outward form is that of cadmium.

The molecule aggregates of lead appear to be forced together like a mirror reflection. The conclusion seems warranted that every separate molecule can be bonded only at one particular point and that it unites with another molecule only at its corresponding point.

In the case of lead, fissures are formed even under comparatively light loads, the reason for which probably is that separation of the bonds is not resisted by increased chemical forces. It is quite natural that any appreciable addition of lead destroys the grain structure of the alloy, owing to this peculiarity of the lead molecule. The special properties of the antimony molecule relate it to arsenic and phosphorus, and its close relationship to arsenic particularly explains its hardness and brittleness. Antimony is in a measure an antidote to tin, moderating the too pronounced characteristics of metallic tin, which is of crystalline grain but in its pure form not hard enough and without the required shearing properties.

It is beyond doubt that too high a pouring temperature results in the loss of appreciable quantities of antimony. Antimony burns, and the result of this combustion is substantially the same as if ethylene, methane and propane are burned.

Dr. Kaul says he has studied the relationships between antimony and bismuth with special care, and found that there exists between tin and lead on the one hand and between antimony and bismuth on the other, not only a great similarity as regards molecular weights, but also one depending upon the molecular structure.

The difference in the structure of bismuth and lead consists in the fact that bismuth as a single molecule in a grain element shows a curved portion which is jointed to a straight portion whereas lead consists of a straight portion followed by another straight portion.

Details Are Highly Important Factors in Modern Business

Careful attention to small marketing operations and methods responsible for making satisfactory profits. Often revolutionary changes are not advisable.

By Harry Tipper

THE balance sheet showed that the concern had done a business of well over a million dollars. This represented a growth of about 10 per cent over the previous year. Still the profit line was not visible, except with the aid of a microscope. The reason for this state of affairs was not apparent.

Of course, arbitrary cuts could have been made in the organization to produce a balance sheet of a more hopeful character temporarily. In fact, the officers considered the expedient of a horizontal cut of 10 per cent as a means of placing the company on a good financial basis from the accounting standpoint, but they knew that the principal burden was the excessive fixed charge due to the enlargements at the time of the war and that a cut in the organization to meet these excessive charges would hamper seriously the real work of the company—that of securing a greater volume of business.

The matter had been discussed from every standpoint and some reductions of expenditures had been made here and there through the removal of organization developments not altogether justified by the volume of business being done. This was not sufficient to close the gap between gross and net and the increased volume was not forthcoming, despite the forecasts of sales force and jobbers alike. Further reductions were strenuously fought by the responsible department heads as likely to have a detrimental effect on the product, the service, or the maintenance of present volumes.

Finally the president added to his staff, in an advisory capacity, a man who was known for his patient and effective examination of such problems and for his tactful and diplomatic handling of them. This man spent a little time looking around the factory, the office, and the sales organization. He went out on the road for a few weeks, visiting customers and dealers. Apparently he had nothing in mind. He made no recommendations, although he succeeded in becoming friendly with the entire organization and kept his ears wide open for suggestions.

Finally he began to make some suggestions. His first ones were trifling. He proposed to the sales manager a

change in the duties of his assistant, some small changes in the report forms, a little closer follow-up of correspondence. Further suggestions related to the more effective handling of sales conferences, strict coordination of advertising and selling by establishment of visible market objectives, and an outline of methods to be used in attaining that end.

None of these ideas were new in themselves, nor were the others which followed; none of the suggestions were big or revolutionary. One small item followed another here and there, from the handling of correspondence to the writing of advertising copy. Only in one respect did they differ from the usual. In every case the work was done so that the department head was not quite sure who made the suggestion. It looked to him almost as if the idea was his own, and he appropriated it in quite a

few cases. Also the man's attitude on system was interesting. He seemed to believe that the least amount of system capable of maintaining order was the best, and in a few cases he initiated considerable cutting in the systems already in use.

Almost imperceptibly as this work went on a little plus enthusiasm began to appear in the organization. Some additional cooperation was obvious. Although this consultant had suggested putting on one or two more people

and had frowned on any cuts, the progress of the work in the commercial side of the business showed less percentage overhead than the previous year and the volume began to come in. The result was excellent. Profits increased. Business grew reasonably in volume and not a visible policy change had been made in the whole readjustment.

I was interested enough to ask the gentleman how he came to attack the problem in the way he did, apparently doing the work of clerks—detail work—and yet making it count.

It had been my experience at all times that when a concern couldn't make money, either the directors or officers looked around for some great leader—a Moses, Alexander or Napoleon—and then confided the organization to his care, even if he had to wreck it in order to build it. In fact, I have often thought that the officers

THIS is a story of the novel methods used by a consultant in marketing to put a failing firm on a profit-making basis. Mr. Tipper tells how this man brought about a marked change in conditions without making any suggestions which called for radical readjustment of policies or methods. The business philosophy and psychology behind his ideas are discussed in an interesting manner.

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and directors would be greatly disappointed if some spectacular work was not thrown on the screen as a result of the change. So this man's method of approaching such a problem seemed novel.

Reasons for Methods Used

No manufacturer will permit a new man to come in and scrap his manufacturing equipment without a most excellent reason, tested and sounded in every conceivable way; but in the commercial business of marketing, the manufacturer, or the governing body of the corporation, seems to be glad to scrap all policies, ideas and developments whenever the balance sheet assumes a yellow tinge for a period long enough to pinch anybody. Therefore I took occasion to find out why this man went about the matter so softly and with so little change.

Here are some of his ideas:

"There are few organizations that fail because of fundamental errors in the plan of doing business. Most of the organizations I have known have made or broken themselves on the detail, particularly on the understanding and morale of the detail man.

"Take the case of Jones & Smith. They had a good product, good salesmen, and a good line of customers, but they failed because they had made the rules and regulations of their business like the laws of the Medes and Persians, and the detail men lost customers faster than they could be replaced. When I went in on that job, Smith wanted me to fire the whole bunch. He said they didn't have any judgment, etc. The detail men, however, speedily proved to me that Smith had hammered it into them, in season and out of season—The rule says so and so and you'll have to abide by it.

Personal Element Important

"Most organizations have an average bunch of men. One or two concerns in any field have a group somewhat above the average, because they know how to inspire and handle men. They're not always the largest concerns,

either. However, if you look over many organizations, as I do, you will find that most of them have about as good a bunch of men as the rest. Now if the men are about the same, why do firms differ so thoroughly in the effects of their work? It's a matter of detail; human detail as well as operating detail.

"If a manager says a quarrel between two of his men is a small matter, I rate him as a poor executive. The quarrel seems more important to those two men than the profits of the concern, and it is important to the concern because its profits are involved.

"If a manager of men does not know how to keep the detail so that men continue to be inspired, he is losing the plus enthusiasm, which, after all, makes the man profitable.

Delegation of Authority Needed

"Detail requires a proper delegation of authority to secure a constant order in operation, and it takes a wise head to keep a proper knowledge of the way the detail works, without either originating all its system or enforcing its adoption. I do it by selling the idea to each operator, so that it is his own, not mine, before he begins. It is a good system, and few startling changes would be necessary in business if work was done that way. Here a little, there a little, is a much safer way to increase both profits and volume than the spectacular revolution of usual methods.

"By the way, I always endeavor to have my secretary understand all my purposes and difficulties, even in detail. I find she relieves me of so much more when she understands. That is the chief business of the executive—to develop understanding and judgment in his subordinates, so that they not only do their work, but so that their growth impels them to relieve him of an increasing amount of his work. Understanding and judgment in business operations are matters of detail.

"The only important things in business are the details."

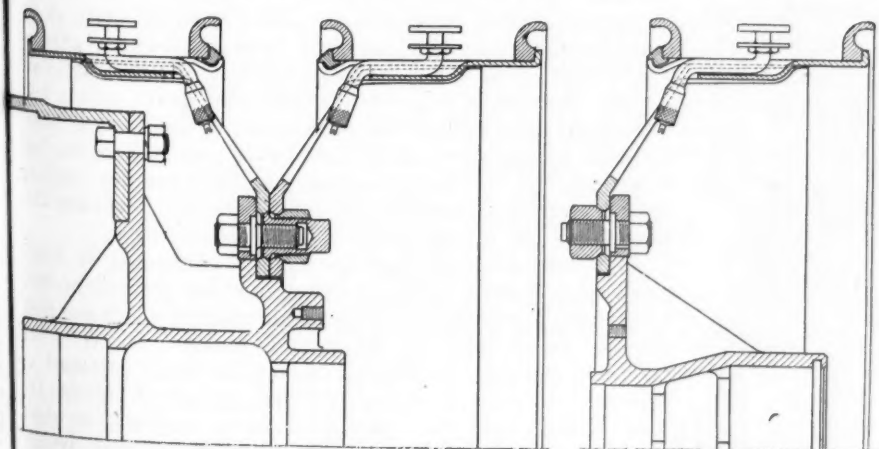
Budd to Make Disk Wheels for 7 in. Pneumatics

BUDD Wheel Co. of Philadelphia is arranging for production of Budd-Michelin wheels suitable for application of either single or dual pneumatic tires in-

tended for use on trucks of 5-ton capacity. These wheels have been made for some time in sizes for 36 by 6 in. and smaller tires. They now are to be manufactured for 20 in. diameter, for 34 by 7 and 36 by 8 in. tires and in 24 in. diameter for 38 by 7 and 40 by 8 in. tires.

These wheels are not interchangeable on present standard hubs inasmuch as a ten-hole center construction is employed to insure greater stud capacity.

A sectional view of the new wheel is shown in the accompanying cut. It is asserted that trucks with dual 38 by 7 in. pneumatics have been operated successfully in Paris and Edinburgh for several months past. The Budd Wheel Co. is making arrangements for extensive service tests of tire and wheel equipment of the new size in this country.



Sectional view of Budd-Michelin wheels for single and dual 38 x 7 in. pneumatic tires as applied to five-ton Mack truck hubs

Small High Speed Engine Used in New German Car

Simson, designed by Steiger engineer, has four-wheel brakes, connected diagonally in pairs. Four-cylinder powerplant is overhead valve type, carries two camshafts, and has two inlet and two exhaust valves for each cylinder. Wheelbase is 118 in.

By Benno R. Dierfeld

ONE of the newer small cars on the German market is the Simson, manufactured by the Simson Works of Suhl, Thuringia, a firm that has specialized in the manufacture of firearms in the past. The car is the design of the same engineer who also is responsible for the Steiger car which was exhibited at the Importers' Salon in New York some months ago.

The engine is a four-cylinder overhead valve type, with

very small cylinder dimensions but capable of exceedingly high speed and, consequently, of considerable output. The cylinder bore is $2\frac{3}{4}$ and the stroke $5\frac{5}{16}$ in., making the piston displacement approximately 122 cu. in. At 2600 r.p.m. the engine is said to develop 40 hp. and at 4000 r.p.m., 60 hp. Owing to the large ratio of stroke to bore, it is necessary to cut slots in the lower ends of the cylinder barrels, which extend into the crankcase, in order to prevent interference of the connecting rods with the barrels.

All of the cylinders are completely surrounded by cooling water and the water space is especially large between the two inner cylinders. The cylinder head is held to the block by five central bolts, which are extended to also hold the cam gear housing in place, and by additional shorter bolts at the sides which pass through overhanging flanges at the top of the cylinder block and are hidden by sheet metal covers.

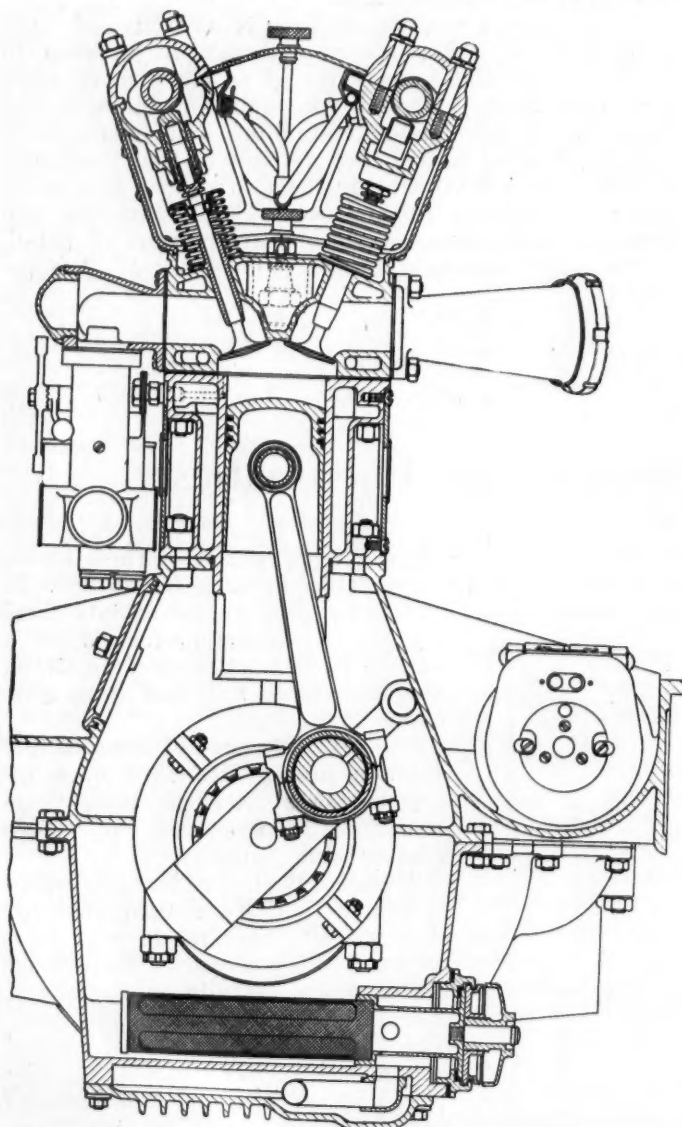
Dual Valves Used

Two inlet and two exhaust valves are used per cylinder and are arranged symmetrically in the cylinder head, inclined at an angle of 20 deg. to the vertical. The valves are made of 3 per cent nickel steel and are held to their seats by two springs each, of different strength. Adjustable pushrods are inserted between the cams and the valves. The ends of the pushrods in contact with the cams have cylindrical surfaces, which gives the same lifting characteristics as though roller followers were used.

Separate camshafts are employed for the inlet and exhaust valves, each shaft being supported in three plain bearings. At the forward end of the engine there is a vertical shaft which is driven from the crankshaft through a pair of spiral bevel gears. This vertical shaft at its upper end drives the fanshaft through another pair of spiral bevel gears and from the fanshaft the camshafts are driven through helical spur gears, the gears on the two camshafts being offset longitudinally. The vertical shaft is made in two parts, each part being mounted in two ball bearings and the two connected together by a jaw coupling which permits of relative motion of the two parts and also facilitates the dismounting of the cylinder head.

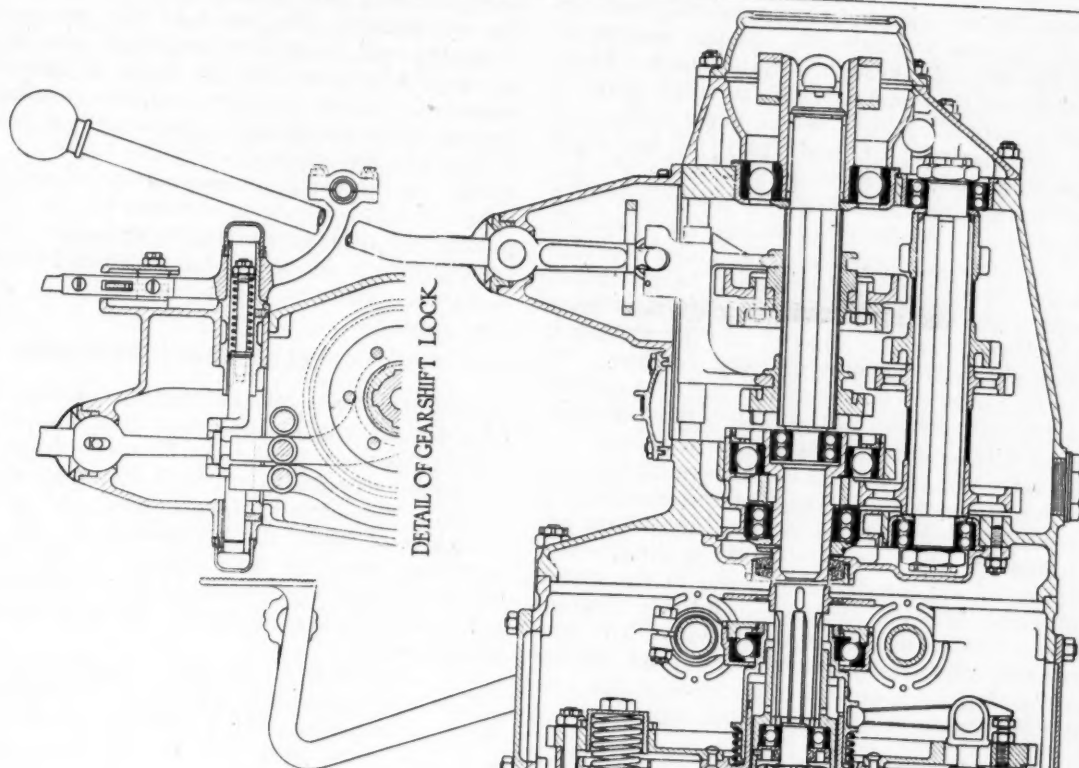
The camshaft housings are cast of aluminum, in upper and lower halves. The spark plugs are located in deep pockets at the center of the cylinder heads, which are completely surrounded by the water jacket. By reference to the drawings it will be seen that each camshaft is located in a sort of tunnel and that the space between the two tunnels and the cylinder head is inclosed by sheet aluminum plates supported from the cylinder head. Within this inclosed space are carried the ignition cables, which makes for a smooth exterior.

The fan is a three-blade cast aluminum design; its

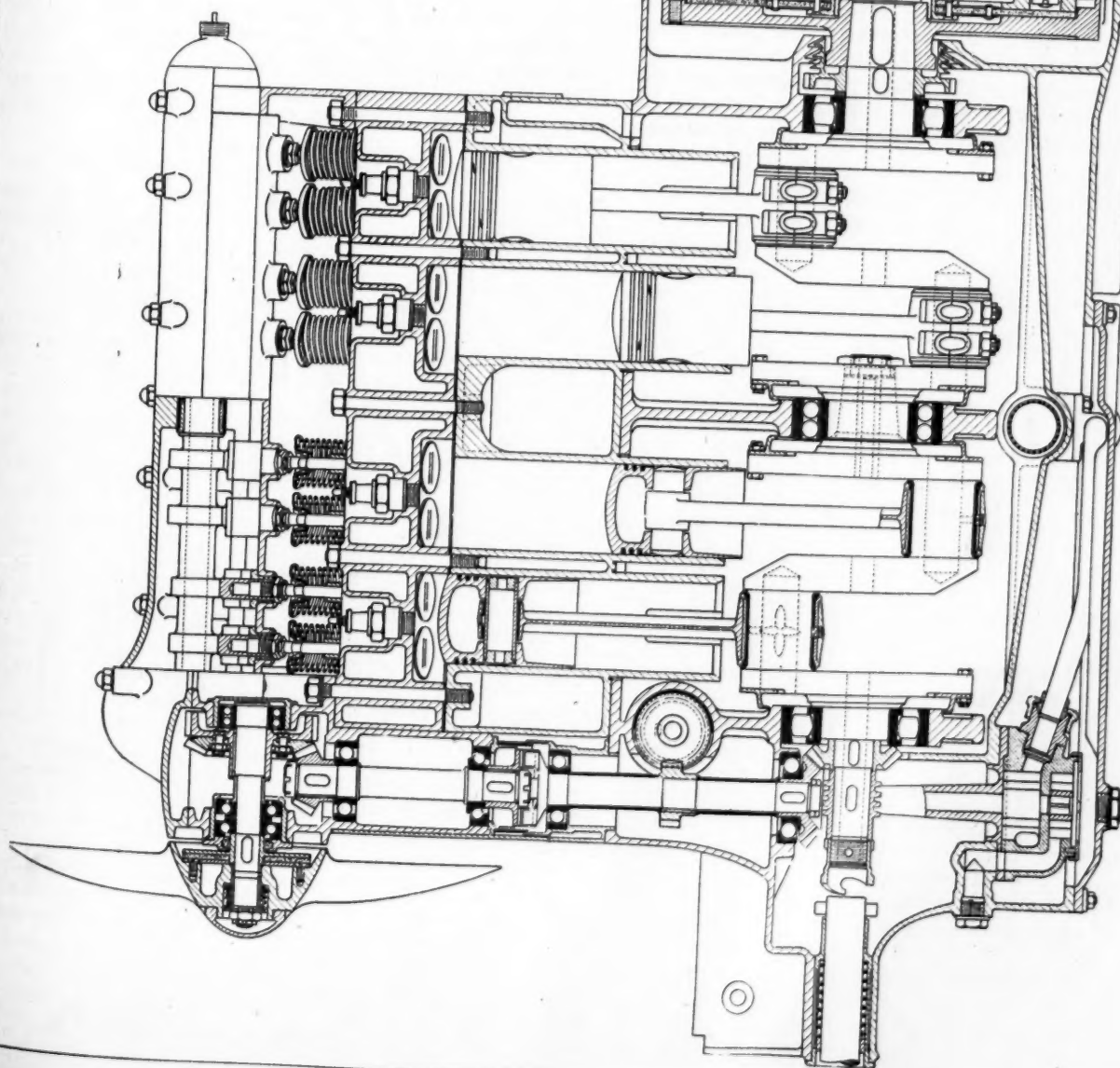


Cross section of Simson four cylinder engine with dual valves and overhead camshafts

Detail of transmission showing selecting and locking mechanism



Longitudinal section of Simson four cylinder powerplant



shaft is mounted in two cup and cone type ball bearings at the forward end and a double row annular bearing at the rear, and the drive is through a plate clutch. From the lower section of the vertical shaft a cross shaft is driven through a pair of inclosed helical gears, this cross shaft having the magneto connected to it at the right and the water pump at the left.

Three anti-friction bearings support the crankshaft. The center bearing is a double row ball bearing while the two end bearings are roller bearings. The roller bearings are of a special design, the rollers being barrel-shaped and running on a grooved inner and concaved outer race. An advantage claimed for this type of bearing is that it gives the shaft a certain amount of axial freedom. To permit of the mounting of a center bearing of moderate size, the crankshaft is divided in the center, the two parts being united by a tapered and bolted joint as shown.

Connecting rods are of conventional design, but the caps are fitted to them with recessed joints and the cap bolt lugs are scalloped out for lightness. The pistons are made of magnesium alloy and carry three rings each. Blocks of soft metal are placed in the bores of the piston bosses at opposite ends of the piston pin, to prevent rubbing of the latter against the cylinder bore. The pins are case-hardened and are of the floating type, having bearings both in the bronze-bushed upper ends of the connecting rods and directly in the magnesium pistons.

Lubrication Details

Lubrication is by direct pump feed to the crankshaft main bearings, through oil collectors on the crank arms and oil ducts through the crank pins to the crank pin bearings and by splash to the piston pin bearings and the cylinder walls. Two gear-type oil pumps are mounted on the same shaft in a forward extension of the crankcase,

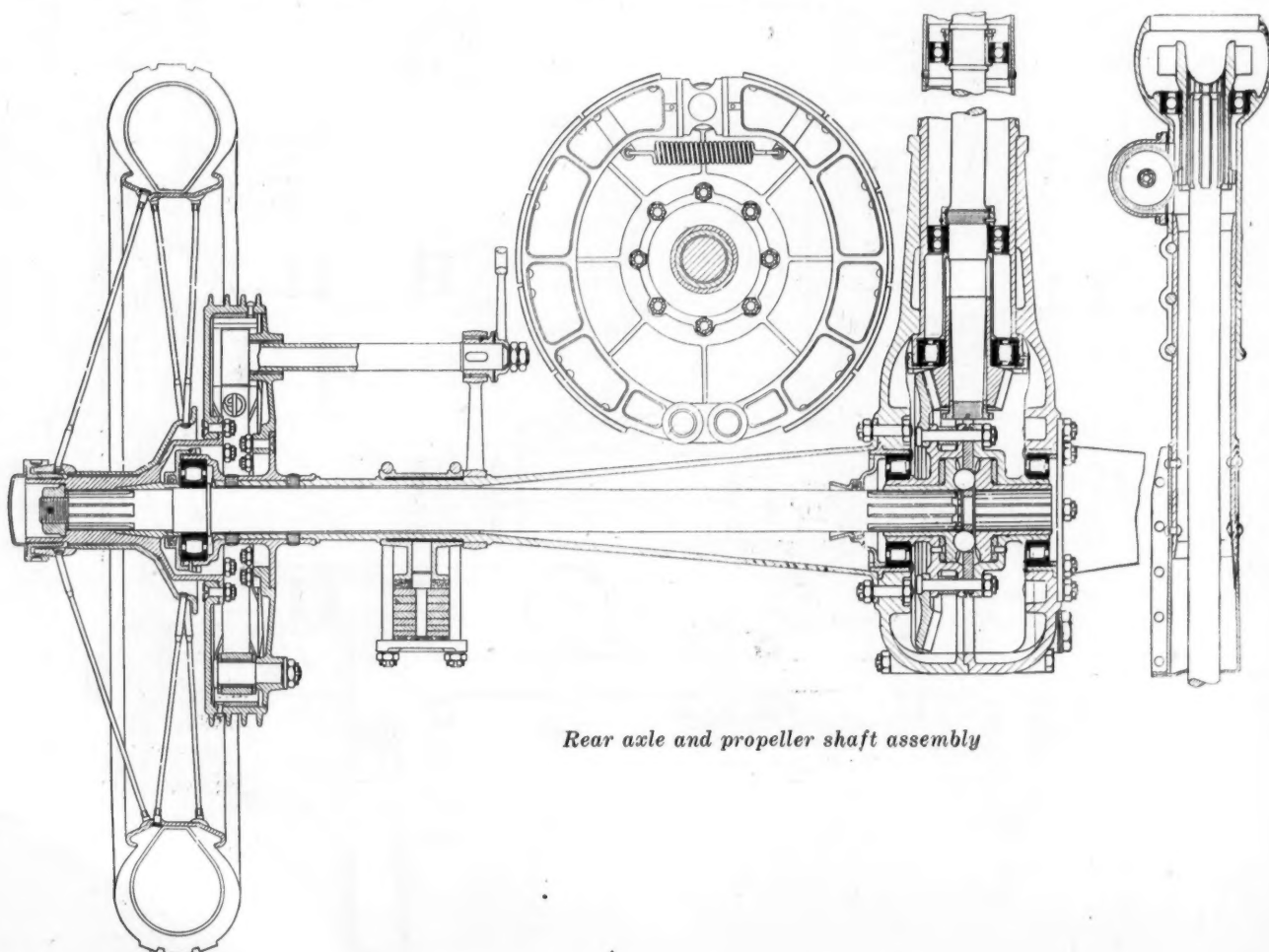
their common shaft being driven by helical gears from the crankshaft. The lower of the two pumps draws oil from the well below the crankcase and feeds it through a pressure strainer into the main oil distributing header, whence it is fed through separate distributing channels and oil rings to the main and crankpin bearings.

The oil that drains down the sides of the crankcase collects at the center at the bottom of same, whence it is drawn through a suction strainer by the upper of the two pumps and returned to the oil well. As the oil leaves the feed pump it is under an average pressure of 28 lb. p. sq. in. There is a triple oil-guard at the rear end of the crankshaft.

Oil Strainers Accessible

From the main oil distributing header already referred to leads are run to the center bearings of the camshafts on the cylinder head. At these bearings the oil enters the hollow camshafts, which it leaves again through radial holes at the center of each cam and at the other two bearings. Finally the oil collects on the bottom of the camshaft housings and returns to the oil well through the housing of the vertical shaft, lubricating the bearings and gears of the camshaft and accessories drive at the same time.

An adjustable oil pressure regulating valve is located at the forward end of the main distributing header. As may be seen from the drawings, the oil strainers are so arranged that they can be readily removed from the crankcase, even without tools. The oil filler, at the front of the crankcase, is of such large size that no funnel is necessary for replenishing the oil supply. There are two water outlets from the cylinder jacket, one on each side. Owing to the use of overhead valves and camshaft housings on top of the engine, it would not be practical



Rear axle and propeller shaft assembly

to connect the water return pipe to the top of the cylinder head in the usual manner, and in order to make the flow through the jackets uniform the double outlet is used.

The same engine also is manufactured with only one pair of valves per cylinder, the valves in that case being arranged vertically. Whereas the engine with single valves develops 35 hp. at 2400 r.p.m., the engine with dual valves develops 40 hp. at 2600 r.p.m. and 60 hp. at 4000 r.p.m.

The unit power plant is formed with integral supporting arms and with continuous webs between the crankcase and the frame, which makes the use of a separate underpan unnecessary. A Zenith carburetor is fitted and is supplied with fuel from a 17-gal. rear tank by vacuum feed.

A clutch of the single plate type is used. It comprises a steel driven disk arranged between the flywheel web and a presser disk, the three disks being pressed together by a set of six coiled springs. The two outer plates are provided with facings of copper-asbestos fabric and the construction is not exactly as shown by the drawing. It will be noticed that the flywheel is keyed to the crankshaft and that the clutch shaft is piloted on the end of the crankshaft by an annular ball bearing. There are two cup-and-cone type ball bearings in the clutch throw-out collar. In addition to the circular set of six clutch springs there is a light spring concentric with the clutch shaft, but this serves only to take up lost motion in the clutch control mechanism.

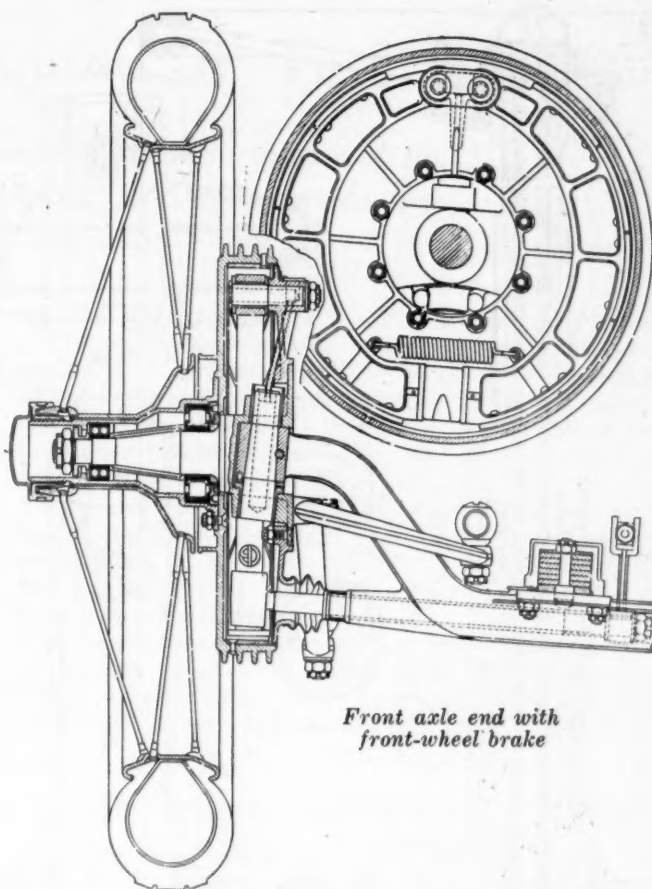
When the clutch is fully disengaged the rear face of the clutch throw-out collar, which is of bronze, comes up against a disk mounted on the clutch shaft directly in front of the forward transmission bearing, which combination acts as a clutch brake. The clutch is disengaged by means of three double-armed levers which are pivoted on studs bolted into the presser plate, the outer ends of which levers bear against set screws screwed into the clutch cover. These set screws are provided with lock nuts and serve for clutch adjusting purposes. The part referred to as the clutch housing, and which rotates with the flywheel, serves also as a starter gear ring.

The gearset affords four forward speeds and is controlled by means of a ball-mounted lever. At the forward end of the primary shaft there is a double felt ring to prevent oil from the gear housing getting into the clutch compartment. This shaft is made hollow and is carried one in single-row and one in double-row ball bearings. The constant mesh pinion is located between these two bearings, and as a result of this method of mounting the transmission is said to operate unusually quietly.

To promote the lubrication of the constant mesh gears a passage is cored in the gearcase directly above these gears. The pilot bearing for the tail shaft is of the double-row ball type. At the rear end the tail shaft is carried in a large ball bearing, and the lubricant in the gearcase can pass freely through this bearing into the ball socket for the forward end of the propeller shaft tube, any excess lubricant returning from this socket to the gearcase through small oil return holes into a cap over the rear bearing on the secondary shaft.

The secondary shaft is mounted in double-row bearings at both ends. It is of the same diameter and is splined in the same way as the sliding pinion shaft, which facilitates production. Shifting and locking of the gears is effected in the following manner:

Connected to the shifter lever is a rectangular block which has guide pins on both sides that are adapted to slide transversely in the transmission case cover plate. The guide pins automatically lock the sliding bars which are not in use at any time. A spring plunger serves to lock the reverse pinion in place.



Front axle end with
front-wheel brake

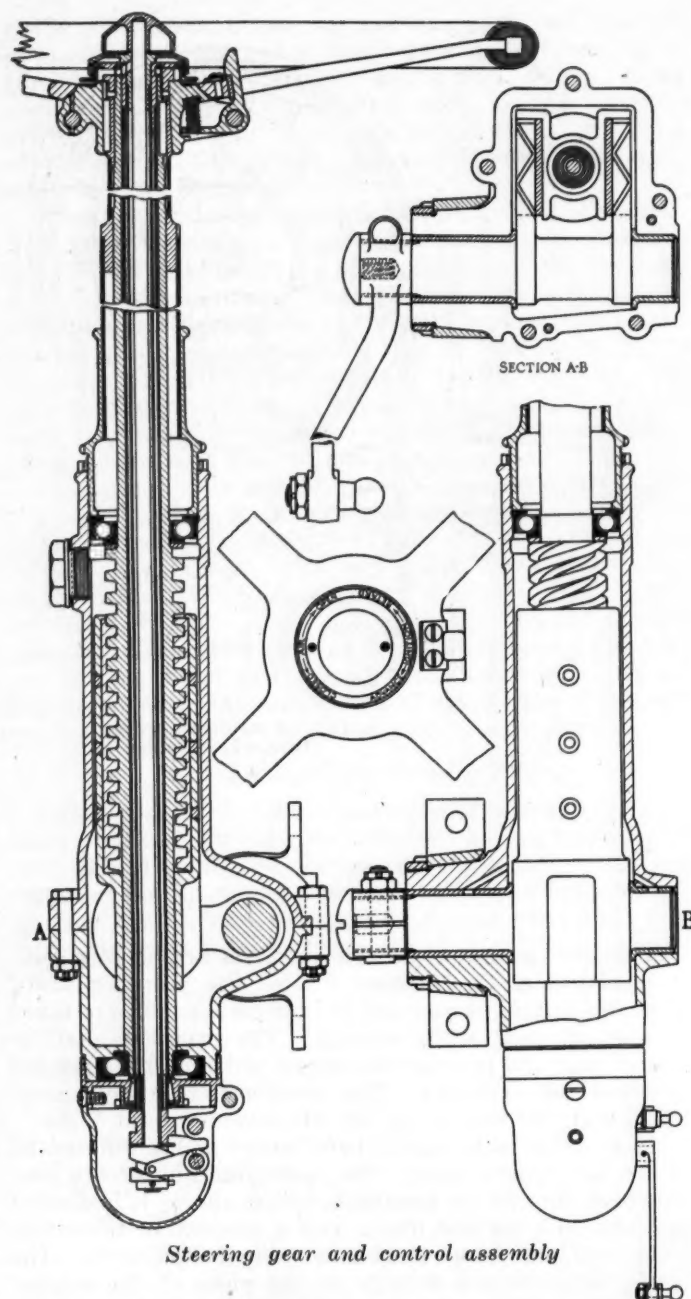
A single inclosed combined universal and sliding joint is employed at the forward end of the propeller shaft. Both the driving thrust and the torque reaction are taken on the propeller shaft housing. The propeller shaft is rather long, and in order to prevent whirling it is mounted in three ball bearings. The speedometer drive is combined with the hub of one of the universal joint forks.

Final drive is by spiral bevel gears and a differential of the ball type is used. The center housing of the rear axle is of silumin, an aluminum-silicon alloy. It is divided centrally in a vertical plane, with a recessed or telescoped joint, and has flared steel axle tubes bolted to it. The small funnel-shaped fittings at the sides of the central housings, besides acting as felt retainers, serve to guide the axle shaft when these are inserted.

Roller bearings with barrel-shaped rollers are used back of the bevel driving pinion and at the wheels, while similar bearings with plain cylindrical rollers are mounted on both sides of the differential gear.

Detachable wire wheels with 32 by 4 $\frac{3}{4}$ in. tires are fitted. The long semi-elliptic rear springs are under-slung. All four wheels carry brakes, the brakes being connected together in pairs diagonally. Operation is through cables.

Below the brake pedal shaft there is another parallel hollow shaft which extends through the crankcase and is connected to the pedal shaft by means of lever arms and an adjustable link. This lower shaft carries at each end an S-shaped equalizing lever with grooves for the wire cable. The cable from the left front-wheel brake passes over the lower arm of the S-lever at the left, then through the hollow shaft, over the upper arm of the S-lever at the right and on to the right rear-wheel brake. Similarly, a second cable connects from the right front-wheel brake, over the lower arm of the S-lever at the right, through the hollow shaft and over the upper arm of the S-lever at the left to the left rear-wheel brake. Hence all four brakes



Steering gear and control assembly

are operated simultaneously by the pedal, and the same brakes also are operated by the lever.

At their ends the brake cables are provided with a hollow threaded part which is hinged to the brake cam lever, and brake adjustment can be made by means of this threaded joint, the clearance or slack of one front-wheel brake and the opposite rear-wheel brake being adjusted at the same time. Another means of adjustment is provided in the form of a turnbuckle with handwheel in the link between the arms on the pedal shaft and the parallel hollow shaft, which adjusts all four brakes at the same time.

The front axle is of inverted channel section, with steering heads of the Mercedes type. The brake drums are cast of an aluminum alloy and provided with steel liners.

The steering post is made in sections and carries a steering wheel of the tilting type, the design of the tilting mechanism being clearly shown in the sectional view. The gear is of the screw and nut type and differs from other designs of the same class in the manner in which the thrust is transmitted from the nut to the steering arms. The nut has a tubular extension of reduced diameter at

the lower end, which bears on the shank of the screw. At this part of the nut there are two opposite cylindrical sockets adapted to receive the grooved rocking blocks, in the grooves of which the arms on the steering gear shaft are located.

Steering Gear

This design was adopted because practically all pressure on the screw is in the axial direction. By locating the sockets for the rocking disks below the threaded part of the nut, the width of the steering gear was materially reduced. The gear is lubricated with oil, which is poured into the aluminum housing through the plug hole near the top. The nut of the steering gear is very long and consists of babbitt, which is cast in a steel shell and around the screw.

Carburetor and ignition control is effected by means of two milled knobs at the center of the steering wheels. These knobs are fastened to concentric shafts inside a stationary column and are, of course, not affected by the tilting of the steering wheel. From the lower ends of these concentric shafts the movement is transmitted by means of cylinders with helical grooves into which extend pins at the ends of lever arms. These transmission mechanisms are self-locking. The reason for the use of knobs instead of the customary levers is that they do not interfere with the tilting of the steering wheel. The stationary column at its upper end carries a disk with markings indicating the effects of movements of the control levers.

Following are the principal dimensions and weights of the Simson: Wheelbase, 118 in.; tread, 51.1 in.; diameter of minimum turning circle, 34.7 ft.; ground clearance, 8 11/16 in.; weight of chassis, 1543 lb.; weight of four-passenger car ready for service, 1873 lb.

What the Automotive Map May Look Like in 1930

(Continued from page 702)

permanent place for themselves. Even if the automotive industry follows the course of its older brothers and sisters, therefore, it is highly probable that the day will come when conditions will be much the same as they are now.

No absolutely unassailable arguments ever have been presented, however, to show that the course of the automotive industry will run parallel to that of any other industry. It hasn't up to this time and there is no especial reason for believing that it will. Its proportions certainly will not shrink, either in units or in dollar value. Its rate of domestic growth will be less rapid in the future than in the past but the rate of foreign sales unquestionably will be more rapid in every branch.

The background of the picture of 1930 which we see in the crystal ball is not unlike that which unfolds itself today. We do not believe that production will be concentrated much more closely in the hands of a few companies. We do not believe there will be endless mergers and consolidations, nor do we believe that myriads of companies will be wiped out because of pitiless competition and vanishing markets.

We do believe, however, that just as one-crop farmers are learning the economic necessity for diversification of crops, so will one-product manufacturers learn the need for diversification of products.

We believe also that the same economic necessity will compel saner and less expensive methods of distribution of automotive products from the smallest part to the heaviest vehicle.

Mason Laboratory Issues Car Test Results

Data make possible study of comparative performance of four, six, eight and twelve-cylinder products. Engine output determined by adding friction hp. to power measured at rear tires.

TESTS made on various cars by the use of the rear wheel dynamometer in the Mason Laboratory of Sheffield Scientific School, Yale University, are of interest because they give, as a rule, data on the performance of cars in the condition in which they are run in normal service. A tabulation of tests made in recent years on a large number of different makes of cars is presented herewith by AUTOMOTIVE INDUSTRIES through the courtesy of Prof. E. H. Lockwood, who is in charge of this class of work in the Mason Laboratory.

In comparing the results it should be borne in mind that they are not necessarily the best which the make of car in question is capable of producing, but they do show how the particular car tested performed at that particular time. It is a fair assumption that the tests here reported are not less favorable in the average case than would be

tests of similar cars which are in normal service today.

The apparatus used for making these tests does not enable direct measurement of the brake horsepower output of the engine. The power measured is that delivered by the rear tires of the car. To determine engine b.h.p. there are added to the rear wheel hp. the corresponding readings of power losses in the tires and driving mechanism. These losses are determined by measuring the power required to drive the rear wheels and their connecting mechanism, an operation which is performed by driving the wheels through the tires as the latter rest on the dynamometer drums.

A description of the apparatus and methods employed in making these tests appeared in an article entitled "Rear Wheel Dynamometer Tests and Their Significance to the Engineer," AUTOMOTIVE INDUSTRIES, April 20, 1922.

Piston Displ. Cu. In.	Bore and Stroke, In.	Weight lb.	Year Built	Brake hp. of Engine at Various Car Speeds, m.p.h.					
				10	20	30	40	50	60

FOUR-CYLINDER CARS

361	4 3/8x6	3870	1920	25.3	36.6	46.2	54.9	...	...
298	3 3/4x6 3/4	4015	1922	10.8	23.5	36.2	48.7	56.4	57.5
243	3 3/4x5 1/2	3390	1916	9.0	19.6	27.5	31.4	...	...
242	4 1/8x4 1/2	3010	1917	...	20.6	29.6	33.7	...	...
224	3 1/4x5 1/4	3020	1922	12.2	25.7	34.1	37.3	37.6	...
212	3 1/8x4 1/2	2655	1922	8.7	17.0	24.4	29.7	...	...
200	3 7/8x4 1/4	2340	1923	9.8	20.9	28.7	31.6	31.5	...
192	3 1/2x5	2850	1922	8.6	14.8	18.3	19.3	...	...
186	3 1/8x4 1/2	2340	1922	9.2	16.0	18.5	19.3	...	...
186	3 5/8x4 1/2	3120	1923	8.7	18.2	25.5	28.5	...	...
179	3 3/8x5	2670	1923	9.8	20.8	29.2	35.0	36.1	...
177	3 3/4x4	2030	1922	...	13.7	18.3	19.8	...	...
171	3 1/4x4	1850	1923	7.0	14.5	18.3	20.6	...	...
170	3 5/8x4 3/4	2830	1924	...	18.8	26.9	31.5	...	...
143	3 3/8x4	1970	1922	6.2	13.4	17.3	16.0	...	...
130	3 1/8x4 1/4	1750	1923	...	13.6	18.4	18.5	...	...

EIGHT-CYLINDER CARS

358	3 3/8x5.0	4500	1921	14.6	32.9	46.7	58.5	61.8	62.8
332	3 1/4x5 1/2	4110	1921	...	29.6	43.0	54.7	62.4	...
314	3 1/8x5 1/8	4395	1919	16.9	33.8	49.6	63.6	67.8	64.0
265	3 1/4x4.0	3405	1922	...	38.3	46.7	53.8	...	...
247	2 7/8x4 3/4	3240	1917	12.0	22.2	30.2	37.0

TWELVE-CYLINDER CARS

424	3.0x5.0	4460	1916	...	37.7	54.1	69.0	76.6	...
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Piston Displ. Cu. In.	Bore and Stroke, In.	Weight lb.	Year Built	Brake hp. of Engine at Various Car Speeds, m.p.h.					
				10	20	30	40	50	60

SIX-CYLINDER CARS

585	4 3/8x6 1/2	5181	1916	...	37.4	56.0	70.3	80.1	82.0
572	4 1/2x6.0	5150	1922	18.2	34.6	48.7	60.8	70.4	73.4
525	4 1/2x5 1/2	5210	1922	...	33.4	46.2	58.1	65.7	68.6
525	4 1/2x5 1/2	5300	1920	...	61.9	73.6	80.8	80.6	...
456	4.4x5.0	4710	1913	...	22.7	34.9	48.1	...	...
414	4.0x5.5	4990	1922	...	40.9	60.2	73.8	80.7	84.4
364	3 3/4x5 1/2	4240	1916	12.5	24.9	34.6	36.1	...	...
354	3 3/8x5.0	3400	1921	11.3	21.9	33.1	39.6	...	...
340	3 3/4x5 1/8	3740	1916	13.9	27.5	40.9	48.5	49.1	...
340	3 5/8x5 1/2	4000	1916	11.2	20.2	27.3	32.1	...	...
330	3 3/4x5.0	3800	1916	12.3	23.1	35.0	40.8	...	...
289	3 1/2x5.0	3470	1923	13.3	29.1	39.6	44.8	42.3	...
289	3 1/2x5.0	3400	1921	11.4	22.8	32.3	38.4	...	...
289	3 1/2x5.0	...	1922	...	21.5	35.9	44.5	49.5	...
289	3 1/2x5.0	3850	1923	...	28.6	38.6	49.3	...	...
289	3 1/2x5.0	3270	1921	...	22.3	31.9	40.1	...	...
268	3 3/8x5	3145	1923	...	28.0	40.7	50.5	48.8	...
268	3 3/8x5	3610	1922	...	23.5	32.1	41.2	46.8	...
248	3 1/4x5	3225	1917	11.1	21.9	30.2	34.4	...	...
242	3 3/8x4 1/2	3230	1920	...	18.2	27.5	34.2	36.7	...
242	3 3/8x4 1/2	3150	1921	11.1	21.9	31.5	39.2	44.6	46.8
239	3 3/8x5	3285	1922	...	20.5	30.2	39.0	39.5	...
224	3 1/4x4 1/2	2760	1917	...	17.7	27.0	33.3	...	...
224	3 1/4x4 1/2	2690	1916	9.3	18.2	25.1	28.2	...	...
224	3 1/4x4 1/2	3380	1923	10.5	22.5	33.7	42.9	49.3	...
224	3 1/4x4 1/2	3290	1917	...	20.2	24.6	25.1	...	...
224	3 1/4x4 1/2	3275	1919	11.4	21.9	30.8	34.7	...	...
219	3 1/8x4 3/4	3360	1923	9.9	20.0	28.6	34.3	34.2	...
207	3 1/8x4 1/2	2900	1921	...	19.4	26.7	30.9	...	...
199	3 1/4x4	2900	1921	8.0	16.3	20.7	23.0
196	3 1/8x4 1/4	...	1923	...	19.1	25.6	29.4
191	3 x4 1/2	2640	1922	...	18.5	25.3	22.5

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Business and Science

EXPENDITURE of money for purely scientific research sometimes has been frowned upon by the practical business man, because he could not see any definite relation between a maze of test tubes or complex apparatus and commercial production economies. Recent years have witnessed so many applications of research results in factory work, however, that such activities are likely to be encouraged more widely in the future.

Probably no more complicated subject has been presented to the layman than the latest developments in the theory of matter. Atom, electron, proton, and radiant energy are fast becoming familiar terms, but the exact meaning of the statements in which they are used remains a mystery to the average automotive executive. Nevertheless newly developed knowledge of this action of these very factors, so difficult to understand, is playing a constantly more important part in the efficient operation of modern plants and in the design of automotive equipment.

Ultra-violet rays are being used to predetermine

the quality and durability of body fabrics and body finishes. A forty-eight hour test has been devised to take the place of two years service on the road. Studies in chemistry have made it possible to protect wood body parts from high temperatures and thus permit the use of high bake enamels on wood framed units. Investigations in the transfer of radiant energy are making possible the design of more efficient power plants, and there is even talk of transmission of power by radio waves.

The work of the scientist each year is becoming more complex rather than simpler, yet the results of his efforts are being applied to practical work more quickly than ever before. The scientist is becoming more of a business man and the business man more of a scientist. The automotive industry stands to gain heavily from such coordination.

Graft Is No New Phenomenon

OUR Republic is not going to be rocked off its foundations by the revelations and the alleged revelations which are being made before Congressional investigating committees in Washington. The testimony makes much more interesting reading than it would if it were legal evidence, but it doesn't mean nearly as much.

Many pessimistic persons with short memories are shaking their heads lugubriously and asserting that the disclosures of perfidy and graft are so appalling that we might as well go into a receivership and liquidate as a government. As a matter of fact, however, we have lived through all kinds of graft scandals in the past, many of them much worse, without serious distress to anyone except politicians.

Most of the phenomena with which we are familiar run in cycles and grafting is no exception. It has been in our midst ever since the days of the Founders and probably always will be. We know instinctively that it is present in our municipal, State and Federal governments, but we think little about it until some one blows the lid off and it is laid bare in its disgusting nakedness.

So far as the present investigations are concerned, we shouldn't forget that they are to a large extent political. The investigators seem to feel little concern over the legality of the evidence they accept. Fact is mixed inextricably with rumor, but the results are the same for the men involved. Once their names are mentioned they are as dead as Hector politically. They may be cleared in the courts later, but it will make no difference with their careers.

The Teapot Dome investigation has gone so far afield that there has been a popular reaction against it and the Daugherty inquiry is getting even farther away from rules of evidence. Every American wants adequate punishment meted out to those guilty of betraying a public trust, but every one with a sense of fair play rebels against having the innocent pilloried with the guilty. We should not accept hearsay statements which cannot be substantiated nor should we place too great reliance on sensational assertions made by persons who obviously are seeking revenge.

Wolves Are Howling at the Automotive Industry Again

WALL STREET'S wolves are straining at their leashes and their mouths are watering in the somewhat premature expectation that they soon will be able to bite large chunks out of the legs of the automotive industry. They are hungry for that particular kind of nourishment because they haven't tasted it for a good while.

Production in the Detroit district has been curtailed and preliminary raids on automotive stocks already have begun. In its considerations of the automobile business, Wall Street seems to ignore logic and economics completely. The bears and wolves are grinning with glee because they seem to think the bottom has dropped out of the market.

As a matter of fact nothing of that kind has happened. The reduction of output after reasonable stocks have been built up is evidence of the sanity of the industry and demonstrates that old and dangerous haphazard methods have been abandoned.

There is nothing surprising or alarming in the situation which has arisen. The passenger car manufacturing branch of the industry has been running practically at capacity for twelve months and it has at last accumulated a surplus of cars. The amazing fact is that supply hasn't exceeded demand long before this.

Output of passenger cars in the twelve months ending March 1, was 3,750,000. It has been realized for a long time that this pace could not be continued indefinitely, notwithstanding all the talk of exceeding last year's record. Demand could shrink considerably under the mark of 1923 and still leave a very satisfactory volume of business.

Factories have made no mistake in pushing production to heights hitherto unknown for the first quarter. If the total output falls to 200,000 for the current month, the aggregate for the first quarter will equal the same period last year, which was the largest ever recorded. Manufacturers simply have anticipated demand instead of waiting for it actually to develop. By so doing they have taken advantage of normal conditions in the materials and commodities markets instead of plunging suddenly into a frantic effort to increase their output with correspondingly higher costs.

Reports from all sections of the country have indicated that buying at retail in November, December, January and part of February was heavier than ever before. This was due largely to an almost unprecedented mild winter in parts of the country usually coated with snow and ice at that time of the year. Then icy

blasts, laden with snow and discomfort, began lashing wide stretches. Interest in motor cars subsided, temporarily, and the makers of them were given an opportunity to build up the stocks they had been talking about so long.

When buying is renewed with the old vigor, as it undoubtedly will be in the near future, this surplus will soon vanish. For practically the first time, producers will have been forehanded enough to put themselves in a position where they could provide their dealers with cars when the dealers wanted them most, which is when the first pleasant days come in the spring. Almost always heretofore there has been a shortage and delays in delivery which have meant sales lost. No such irritating condition will arise this year.

Efforts of manufacturers to build up stocks for spring delivery have been complicated by one factor which has been overlooked in some quarters. That is the increased independence of dealers with or without direct factory contracts. Many of them have positively refused to strain their personal resources for the stocking of cars for spring delivery as they have in years gone by.

For this reason stocks in the hands of dealers are smaller than usual, and it is not surprising that factory warehouses are full. The supplies of unsold cars in the hands of manufacturers are not large enough to be disturbing, however, and they are not nearly as large as reports in "financial quarters" would indicate.

Nothing is wrong with the automotive industry and what has happened has been what had been expected. For the first time in more than a year supply has overtaken demand, and if it had happened in any other industry it would have caused scarcely passing comment in Wall Street. But that small fragment of the United States has not learned yet that the business of making and selling automobiles is resting on a permanent and stable foundation.

There is only one menace in the situation. The automotive industry played a potent part in bringing the country back from the depression which began in 1921 and it has been a vital factor in maintaining prosperity. This fact is well known, and if the bears and wolves succeed in shaking confidence in it, the psychological reaction may have a blighting effect on business generally, for the calamity howlers have howled so long that confidence in the future, especially in a Presidential year, is none too secure.

This is no time to be raising up scarecrows to frighten purely hypothetical marauders. J. D.

National Transport Policy Drafted

U. S. Chamber Makes 14 Recommendations

One of Them Proposes That Road Users Should Bear Entire Cost of Maintenance

WASHINGTON, March 25—A general and more systematic use of motor transport as a means of solving the country's transportation problems and developing transportation facilities was recommended this week by the United States Chamber of Commerce in its proposed national policy of transportation development, looking to the coordination of rail, water and highway transport.

The proposal was mailed today to the 1200 organization members of the Chamber for their consideration and adoption.

Altogether fourteen recommendations are made by the organization, four of them being related directly to truck and other motor transport, probably the most revolutionary being that passenger car and truck users of the highways should pay the entire cost of maintenance through a special and additional tax levied against the automobile industry. The four recommendations are as follows:

Recommendations Affecting Industry

Optional store-door collection and delivery with reasonable and separately itemized trucking charges in the published tariffs be established as rapidly as practicable by agreement between carriers and shippers, beginning at the center of the greatest congestion.

Wherever experience indicates that it will be in the public interest, regulatory bodies should facilitate the utilization of motor transport to replace uneconomical forms of rail transportation, to relieve yard and terminal congestion and to extend existing steam and electric railway service.

The rates and services of motor common carriers, both freight and passenger, should be subject to regulation by the State and Federal commissions which have jurisdiction over the operation of other common carriers having particularly in view insuring to the public adequate, economical and continuous service.

In addition to bearing an equitable share of the general tax burden, the road users should pay the entire cost of maintenance through special taxes being applied exclusively to that purpose.

Other recommendations follow:

The national transportation policy should aim at development and maintenance of

Business in Brief

NEW YORK, March 24—It seems to be the old story of the backward spring which has made for irregular conditions, slowing both trade and industry. Coupled with this there is the political situation to embarrass things generally, not to overlook price uncertainties.

In industry, building seems to have a front row seat, and it is predicted that it will have a big year. The steel and automobile industries both are most active, but of late a conservative note has been struck. Reports from lumber are varying, with the north Pacific reducing operations, while car loadings of forest products in March have broken many records.

Car loadings in general, however, were not so good for the week ending March 8 as the preceding week, showing a total of 929,505, in comparison with 945,049 and only a little in excess of the corresponding week a year ago. For the first ten weeks of this year, though, there has been a gain of 3.4 per cent over last year and 18 per cent over 1922.

A gain of 13.5 per cent is reported in bank clearings for the week ending March 20 over its predecessor, the total aggregating \$8,378,832,000. This sum exceeds the same week a year ago by 3.4 per cent.

Crops have been helped by the weather, especially west of the Mississippi, where it is expected that wheat will be better than it has been in years. Northern and western Kansas have been helped by the moisture, while Colorado expects the best crop in its history. It is stated by one authority that the acreage in the leading crops this year will show the largest area in corn and oats on record, except in the case of corn in 1917.

Market reports show a decline of industrial stocks, rails steady, money easier and bonds strong.

an adequate system of rail, water and highway transportation with full cooperative service of all agencies that will contribute to economy and efficiency.

The important principles of the Transportation Act of 1920 should be continued without change until there has been further experience.

The principle of recapture of a fair proportion of excess railroad earnings should be maintained in the public interest as essential to the rule of rate making.

Supplementary legislation should be en-

(Continued on page 738)

Federal Mogul Corp. Formed from Merger

Muzzy-Lyon and Federal Bearing & Bushing Consolidate Their Interests

DETROIT, March 26—The Muzzy-Lyon Co. and the Federal Bearing & Bushing Corp., both of this city, have merged into a new corporation, to be known as the Federal Mogul Corp. The new name is derived from the trade names of the products of the two former companies.

Plants of both companies will be continued, giving a combined manufacturing space of more than 100,000 ft. No new financing is to be undertaken in connection with the merger, as the capital of the new corporation is declared ample.

Officers and directors of the Federal Mogul Corp. are made up from the personnel of the former companies. J. H. Muzzy will be chairman of the board; Lloyd P. Jones, president; H. Gray Muzzy, vice-president; David W. Rodger, secretary, and S. C. Reynolds, treasurer. The officers and H. W. Grant, F. C. Heath and C. R. Murphy comprise the board of directors.

Well Known in Industry

Both the Federal and Muzzy-Lyon companies were well-known in the industry. Muzzy-Lyon was formed about thirty years ago, starting to produce babbitt metals about twenty-five years ago. This was followed in the early days of the industry by the production of die-cast babbitts and later Mogul bronze back babbitt lined bearings were introduced.

Federal started ten years ago, producing babbitt lined bearings and bronze bushings and castings for the industry. Later cored and solid bronze bars were added to the line. Muzzy-Lyon specialized in babbitt metals, while Federal specialized more particularly in bronze. Each organization has developed as a complement to the other. The consolidation will give the new company a complete line of engine bearings and bushings, bronze bars, cored and solid, produced by one organization and sold by one sales force.

HAYES EXPANSION APPROVED

DETROIT, March 26—Stockholders of the Hayes Wheel Co. have approved the acquisition of the Hayes Motor Truck Wheel Co., Albion Bolt Co. and the Morrison Metal Stamping Co. as proposed through the issuance of new Hayes Wheel Co. stock and its exchange for stock in the companies indicated.

Car Stocks Expected to Dwindle Rapidly

Good Weather Awaited to Start
Spring Buying—No Talk of
"Lost Business"

DETROIT, March 27 — With good weather, executives of automobile companies declare, the stock of cars that apparently has given so much disturbance to the stock market and upset the calculations of the industry generally will be wiped out within a month. Throughout the industry there is no talk of "lost business" but only "postponed business" and all plans are being made with that thought in view.

Figures are not obtainable from any of the factories on how many cars are banked ahead waiting for the season to open but the Ford Motor Co., which probably has more cars on hand than any other maker, is confident that its surplus can be absorbed in a month.

The combined current production and surplus will be required, declare officials, to meet the buying rush that good weather will produce. Reports received by the factory every ten days from its retail field indicate that already a considerable part of the surplus is being drawn upon.

Weather Retards Ford Sales

Each ten-day period will show large reductions, the factory declares, and with good weather the surplus will all be wiped out in a month. March sales at retail will approximate 200,000 cars in the United States. With good weather this total could reasonably have been expected to reach 300,000.

The General Motors Corp. has issued no word on revision of division schedules. The surplus of cars existent today is the result of planning, executives declare, and is in no respect a surplus that has been acquired because of poor business.

Work will proceed at much the pace that has been planned but there may be temporary layoffs in some departments of some plants in balancing up operations. Under the speed of operations these departments have gone ahead of the division work. Generally there will be a reduction in the number of cars produced but this will not represent by any means a closing of plants nor will it place them at disadvantage for quick resumption of capacity operations.

Hold Down Parts Shipments

Parts and accessory suppliers report a general tendency throughout the industry to hold down shipments, word having been received from a number of automobile factories that schedules for the present will be revised downward. The situation is viewed by parts makers as unavoidable, due to unfavorable weather conditions affecting the retail car market.

This reduction in shipping schedules is reported as holding true in practically

Commercial Fleet Owners Are Using Replacements That Tend to Reduce Operating Costs

AN INTERVIEW WITH V. I. SHOBE,
Assistant General Manager of the Zenith-Detroit Corp.

By D. M. McDONALD,
Detroit News Representative of the Class Journal Company

Detroit, March 26.

HOME after a month's trip to the Pacific Coast during which he visited dealers in practically all large cities from Los Angeles to Portland and many others in intermediate cities between Chicago and the Coast, V. I. Shobe, assistant general manager of Zenith-Detroit Corp., sees assurance of good business for all automotive products in that territory throughout the year.

Although Mr. Shobe centered his attention upon the affairs of his dealers, he could not help but observe, he says, the great development in the use of automotive products that is everywhere evident, with truck and bus operations perhaps coming more rapidly to the foreground in the territory he visited than in any other part of the country. The Pacific Coast presents the ideal field for bus transportation because of its climate, scenic attractions and good roads and there the bus is rapidly outrivalling all other carriers in popularity.

Co-incident with the development of bus transportation, the truck is coming into far greater use than at any time, this being largely explained, Mr. Shobe declares, by the rapid expansion and growth of the territory with its consequent opportunity for industrial development. Only motor transportation can keep pace with the rapid growth of communities and their requirements, and to a large extent, he says, this very growth and expansion is due to the fact that the bus and truck offer the transportation that is essential.

This large and increasing group of motor vehicles in commercial use offers a large replacement market to manufacturers of equipment tending to reduce operating costs, said Mr. Shobe. Though there is a wide market in all classes of motor vehicles for equipment looking toward greater operating economy, this market today is most concentrated among operators of commercial vehicles to whom savings in costs are represented upon the books of their business.

Whole fleets of trucks in many parts of the country are now standardizing on certain equipment, which in many cases means that even new trucks are subjected to changes in equipment which tends toward definite economies in operation. The scrapping of equipment even though new has been found by these operators to be more than compensated for by the immediate and constant economies made possible by such other equipment.

Equipment which results in economy does not receive particular attention in the passenger car field at this time, says Mr. Shobe, except in the case of certain vehicles, such as salesmen's cars and such other cars more directly connected with business use. Gasoline prices are too low at present to be studied for economies by the average car owner, but with increased prices later the question of economical operation will become fully as important to the private car operator as to the commercial fleet owner.

As to development generally in the commercial field, Mr. Shobe sees a steadily growing market for trucks and buses with new lines being established constantly in all parts of the country, and the older lines being steadily augmented as the commercial possibilities of this service become more firmly established. Taxicab operation has reached a higher development than any other form of commercial vehicle and Mr. Shobe views this field as practically closed off to any company which has not large financial resources to withstand a rather extensive development period.

Conversations with oil men in the West and a general study of the oil situation convinces Mr. Shobe that production of oil is at its greatest development at present and that beginning within a short time the industry must make its plans from the standpoint of not only a diminishing supply but a more costly supply because of distances from which oil must be drawn.

every case, the car makers that are proceeding with capacity schedules being limited to hardly more than half a dozen of the important companies. The tendency, however, is reported as decidedly against any wholesale lopping off of orders.

Despite difficulties experienced by dealers in getting cars during the spring rush last year, factories report reluctance by dealers to stock cars this year as one of the factors causing reduced schedules at this time. Practically every dealer has some cars stocked but nothing

like the quantity that normal expectancy on spring buying would warrant. In most cases factories are carrying the bulk of the stored cars at warehouses in branch cities.

FRANKLIN'S ANNUAL REPORT

Syracuse, N. Y., March 26—The annual report of the H. H. Franklin Manufacturing Co. shows net profits of \$1,174,539 after all charges, including reserves for depreciation. The company paid out \$465,317 in preferred dividends last year.

G. M. C. Net Income Put at \$62,067,526

Compares with \$51,496,135 in
1922—Sales in 1923 Reached
Value of \$698,038,947

NEW YORK, March 26—A record breaking year is reflected in the annual report of the General Motors Corp. which shows a net income from 1923 of \$62,067,526, against \$51,496,135 in 1922. This profit was realized from net sales of \$698,038,947, compared with \$463,706,733 in the preceding year. Production of cars and trucks by the various units totaled 798,555, against 456,763, an increase of 75 per cent over 1922 and representing capacity production.

In the net income of \$62,067,526 there is included only such proportion of the profits of the Fisher Body Corp. and the General Motors Acceptance Corp. as was received in the form of cash dividends. The corporation's share in the undistributed earnings of these two subsidiaries was \$9,941,429, which if added to the net income would represent a total of \$72,008,955.

Four Dividends on Common

After paying regular quarterly dividends on the debenture and preferred stocks requiring \$6,887,371 for the year, there remained for the common stock \$55,180,154, or \$2.67 a share. Four quarterly dividends of thirty cents per share each were paid on the common stock, aggregating \$24,772,026, leaving a balance of \$30,408,129 which was carried to surplus. The undistributed proportion of the earnings of the Fisher Body Corp. and General Motors Acceptance Corp. was equivalent to 48 cents a share on the common stock of the General Motors Corp.

As showing the corporation's excellent financial condition, it is reported that cash in banks at the close of the year was \$47,069,805; sight drafts \$13,283,707 and inventories \$138,678,131. Current liabilities amounted to \$79,150,705, leaving an excess of current assets over current liabilities of \$140,750,582. This compares with \$126,476,237 as of Dec. 31, 1922, an increase of \$14,274,345.

The condensed consolidated income account is reported as follows:

	Year Ended Dec. 31, 1923	Year Ended Dec. 31, 1922
Profit from operations and investments, after all expenses before depreciation of real estate, plants.....	\$91,698,666	\$80,355,402
Provision for depreciation of real estate, plants and equipment	15,055,702	13,584,788
Net Profit from operation and invest.	\$76,642,963	\$66,781,613
Less provision for:		
Employees' bonus.....	\$1,906,494	\$1,341,997
Amount due Managers Securities Co.	1,876,119	.....
Employees' savings and investment fund	1,980,583	1,477,216

GENERAL MOTORS MADE 774,617 CARS IN 1923

NEW YORK, March 26—The General Motors Corp. reports the sales by makes of cars for the year ended Dec. 31, 1923, compared with the sales of the preceding year, as follows:

	1923	1922
Passenger Cars		
Buick	218,286	138,501
Cadillac	22,201	22,201
Chevrolet	464,800	240,390
Oakland	35,974	20,853
Oldsmobile	33,356	21,216
Commercial Cars:		
Chevrolet	15,326	2,932
GMC Trucks	6,968	5,277
Oldsmobile	1,497	1,218

Totals:		
Passenger Cars..	774,617	442,981
Commercial Cars.	23,791	9,427
Miscellaneous, including tractors and cars and trucks not now manufactured ..	147	4,355
Grand Total	798,555	456,763

Interest on notes payable	\$357,867	\$1,351,155
	\$6,121,064	\$4,170,369
	\$70,521,899	\$62,611,244
Less adjustments and losses in excess of reserves established therefor...	.....	4,533,796
	\$70,521,899	\$58,057,448
Less provision for Federal income taxes	8,135,000	6,250,000
Net Income	\$62,386,899	\$51,807,488
General Motors Corp. proportion of net income	\$62,067,525	\$51,496,135
Debtenture dividends at rate of 7 per cent	\$2,268,161	\$1,860,936
Debtenture dividends at rate of 6 per cent	3,648,092	3,597,570
Preferred dividends at rate of 6 per cent	971,117	970,721
	\$887,371	\$6,429,227
Amount earned on common stock....	\$55,180,154	\$45,066,907

SURPLUS ACCOUNT

Surplus over and above \$10 per share of no par value common stock outstanding at the beginning of the year.....	\$89,936,863	\$55,814,160
Additions through acquisition of properties .....	.....	117,111
Addition arising from excess over \$10 per share of no par value common stock issued for employees' bonus	354,308	.....
Deduction on account of cancellation of delinquent common stock subscriptions .....	.....	884,200
Amount earned on common stock, as per income account	55,180,154	45,066,907
	\$145,471,325	\$100,113,980

General Motors Sees No Saturation Point

With Completion of Projects
Under Way It Will Have
1,300,000 Capacity

NEW YORK, March 26—Belief that the saturation point is far in the future is evidenced by the announcement of the General Motors Corp. in its annual report that "with the completion of certain unfinished construction projects," it expects soon to have a manufacturing capacity of approximately 1,300,000 cars and trucks a year.

A year ago the manufacturing capacity of the plants of the various units of General Motors was estimated at 750,000 vehicles per year, but the annual report shows that production in 1923 reached 798,555, an increase of 75 per cent over the preceding year. The proposed capacity increase is 63 per cent more than the 1923 production.

Whether or not General Motors will be called upon to use this increase in capacity this year is, of course, a question that time alone can answer, but, at any rate, the corporation is in position to avail itself of whatever opportunity develops.

Explain Expansion Program

A statement accompanying the report, which is signed by Pierre S. duPont, chairman of the board, and Alfred P. Sloan, Jr., president, says:

The position of the corporation with regard to expansion and increased investment in plant and equipment deserves some explanation. Increases in various working capital items are of less moment, as they are in the nature of a liquid investment and fluctuate with the volume of business.

During the year there have necessarily been changes in the plant and equipment accounts and in investments in affiliated companies. The total increase was \$27,294,000 and was distributed as follows:

Expansion of production facilities.....\$13,103,000

Manufacture of additional essential components

Assembly plant operations required for more economical distribution.

Increased investments in affiliated companies (Fisher Body Corp. and General Motors Acceptance Corp.)

Total

The first named results directly in increased capacity; the balance, in general,

(Continued on page 744)

Less: Cash dividends paid on common stock:		
March 15, \$0.30 share	\$6,192,962	.....
June 12, \$0.30 share	6,192,998	.....
Sept. 12, \$0.30 share	6,193,020	.....
Dec. 12, \$0.30 share	6,193,044	.....
Dec. 20, \$0.50 share (special) .....	.....	\$10,177,117
	\$24,772,026	\$10,177,117
Surplus over and above \$10 per share of no par value common stock outstanding Dec. 31	\$120,699,299	\$89,936,863

Continental Motors to Issue New Bonds

Will Place It in Strong Financial
Position, Without Increasing
Debt Materially

DETROIT, March 21—Refinancing of Continental Motors Corp., details of which have been completed and official action on which alone awaits the sanction of stockholders this week, will find the company in a strong financial position, and prepared to undertake a manufacturing program which will tax production facilities of its plants.

Contracts upon which the company is now engaged represent capacity output, and has made it necessary to turn down business which has been offered by one of its largest customers. The company, according to its present plans, will not undertake any further expansion of its present plants. These have been equipped for large volume and will permit of an output of upward of 300,000 engines this year.

To Build for Durant

The company will build a certain percentage of the engines for the new Durant light six, the remainder probably being built by a subsidiary of the Durant organization.

Authorization of the \$10,000,000 fifteen-year sinking fund 6½ per cent gold bonds will be followed by the issuance and sale of \$7,500,000 of these. The proceeds will be used in retiring \$3,750,000 of the 7 per cent gold notes now outstanding, all of which mature in thirteen months, and in addition, will be applied on outstanding bank obligations now amounting to \$3,750,000. The remaining \$2,500,000 of authorized bonds will be available for possible future use.

The bond issue will not materially increase the indebtedness of the company, President R. W. Judson says, in his letter to stockholders. It merely transfers current liabilities, requiring early cash outlays, into long time deferred obligations. After the application of the proceeds of the bonds presently to be sold, the financial statement will show net current assets in excess of \$9,000,000 with approximately \$1,800,000 cash on hand.

Dividend Outlook Good

As a result of the financing, Mr. Judson says, it is the belief of the directors that the company will have established itself in a position where, after making due provision for discharge of current indebtedness and for adequate annual sinking fund requirements to be applied in gradual reduction of the bond issue, a fair and substantial portion of the current earnings will be available for distribution to stockholders.

Under the policy of reinvesting its net earnings in developing its facilities from the standpoint of capacity and efficiency, the company, in the last four years, has

1923 SALES BY G. M. C. AND FORD EXCEEDED THOSE OF U. S. STEEL CORP. BY NEARLY \$60,000,000

NEW YORK, March 25—With a gross sales volume of \$929,000,000 in 1923, the Ford Motor Co. fell only \$71,000,000 short of doing a billion dollar business. This figure, which includes the sales of all its products, discloses the gigantic proportions the company's operations have assumed.

The General Motors Corp. reported "net sales" of \$698,000,000 in 1923. This applies to what some other corporations call their gross business.

The United States Steel Corp., largest industrial organization in the world, did a gross volume of business of \$1,570,000,000 in 1923.

The two largest producers of motor vehicles had a combined total of \$1,627,000,000 in sales, which was nearly \$60,000,000 in excess of the Steel Corporation. If General Motors had computed its business on a somewhat different basis the excess undoubtedly would have been much larger.

Staggering as are the figures themselves, they are not so astounding as the fact that the Ford Motor Co., which began business in 1903 with a capital of \$100,000, of which only \$28,000 ever was paid in, was doing twenty years later a volume of business 60 per cent as large as that of the Steel Corporation, which was formed in 1901 by the merger of eleven great steel companies, with a combined capital of \$560,000,000.

increased net plant investment more than 70 per cent and plant capacity more than double. The first four months of the present fiscal year disclose earnings substantially in excess of those for the same period in the previous year. Since 1920 the net asset position of the company has been increased more than \$5,000,000.

Within the recent past, Mr. Judson has added 180,000 shares of the company's common stock to his already large holdings. This purchase is taken as an indication of his confidence in the company's continued prosperity.

Nash Soon to Take Over Mitchell Motors Factory

RACINE, WIS., March 24—It is expected that the Nash Motors Co. of Kenosha, Wis. will be ready shortly to take over the real estate and buildings of the defunct Mitchell Motors Co. at Racine.

The transfer has been held open by the delay encountered in vacating all of the buildings, but the Mitchell Motor Car Co., a new organization which has taken over the service and parts business, rights to manufacture and use the name and design of the Mitchell, has moved all of its property purchased from the bankrupt corporation to the Lakeview Building on Lake Avenue and Fourth Street, while the purchasers of other parts of the assets have practically completed transfers to other quarters.

All of this delay postponed acceptance of the bare buildings by Nash more than a month. By April 1 it is believed that Nash will have completed its survey of the plant and decided upon equipment details, and then be ready to make public its plants for the use of the property.

TAX RECEIPTS IN FRANCE

PARIS, March 15 (by mail)—French automobile and similar taxes produced 468,540,000 francs last year, being an increase of 71,658,000 on the previous twelve months.

Moller Changes Name of Crawford Auto Co.

HAGERSTOWN, MD., March 24—The M. P. Moller Motor Car Co. is the new title selected for the former Crawford Auto Co., which marks the passing of a name that has been on the roster of the industry since 1904. With it goes Crawford as the name of a car, as it has been determined to call the company's product the Dagmar from now on.

The Dagmar has been on the market for several years, being built in the same factory as the Crawford, but it was not until recently that it was decided to drop the Crawford from the picture altogether. This move followed the decision of M. P. Moller of this city, who has been the sole owner of the Crawford Auto Co. since 1921, when he took it over to protect his holdings.

Mr. Moller recently purchased a new plant in this city, and following this he decided to change the name of the company also. He has decided to add to the Dagmar line by bringing out a smaller car, to sell at \$1,600, while continuing the larger Dagmar, which sells at \$4,500. In addition his company will manufacture the Luxor taxicab for a New York transportation company, the contract calling for 1500 cabs.

No Trucks to Be Shown at Olympia This Year

LONDON, March 15 (by mail)—The Society of Motor Manufacturers has decided not to organize a truck show at Olympia this year. This decision has been arrived at after obtaining the views of all the members of the commercial motor section.

The general opinion is that the collective exhibit to be made at the British Empire Exhibition, which opens in April at Wembley, near London, will very largely displace the need for a specialized truck show.

Owen Reorganizing Automotive Division

Work of Government Bureau
Will Be in the Hands of
Group of Specialists

WASHINGTON, March 25—Representatives of the foreign committees of several associations of the industry met here today with Percy Owen, the new chief of the Automotive Division of the Bureau of Foreign and Domestic Commerce, and were told the plans that have been made for the conduct of the division during the coming months. Reorganization of the department, following out Owen's decision to make it a service adjunct to the growing trade in the export field, also was outlined.

The work of the division, under Mr. Owen, will be handled by a group of specialists who will concentrate their efforts along specialized lines. M. H. Hoepfli will be assistant chief of the division, with W. H. Davidson in charge of information concerning accessory and equipment lines; A. Zimmerman in charge of cars, trucks and motorcycles; H. H. Tewksbury in charge of statistics and H. H. Kelly in charge of publications and similar work.

One change already made effective by Mr. Owen concerns the statistical listing of passenger car exports, which are tabulated each month on the basis of value. Confusion in the making up of shippers' export declarations, however, has been experienced as some exporters have declared the values to be wholesale prices, in some cases retail prices, and others have added to either of these figures the crating costs and freight to seaboard. Under the plan announced today, these listings are to be made hereafter as the wholesale factory price, with no addition of boxing or freight.

Among those attending today's meeting were John J. Palmer, Dodge Brothers; M. C. Reichert, Studebaker; Morgan Goetchius, General Motors Export, and George F. Bauer, all representing the National Automobile Chamber of Commerce. The Motor and Accessory Manufacturers Association was represented by Herman Duester. F. B. Caswell of Champion and W. C. Allen of Black & Decker represented the Automotive Equipment Association, while U. A. Hicks of Indian appeared for the Motorcycle and Allied Trades Association.

National Transport Plan Drafted by U. S. Chamber

(Continued from page 734)

acted in harmony with the general principles of the Transportation Act to facilitate consolidations by voluntary action subject to the approval of the Interstate Commerce Commission.

The policy of connecting and coordinating terminal facilities, with provisions for joint use prescribed by the I. C. C. be applied as rapidly as practicable.

In place of any attempt to deal with rates and other problems of regulation of common carriers through legislation—necessarily inelastic—such problems be handled by properly constituted Federal and State administrative agencies.

Instead of any attempt at general reduction at the present time the existing administrative agencies, under their established methods and with all possible dispatch consistent with proper study and investigation—proceed with readjustment of relative freight rates.

Congress should direct the Army engineers to make a comprehensive survey and present a definite plan and schedule of priorities for waterway development.

To determine more fully the possibilities of inland waterway transport under private operation and thus enable the Government the sooner to dispose of the lines, the Secretary of War be given authority and funds to continue operation of the barge lines on the Mississippi and Warrior Rivers in accordance with good commercial practice.

Waterways service, including through rail-and-water routes and rates with suitable divisions of rates between the two types of carriers, be facilitated by public and private agencies wherever economically warranted and in the public interest.

The policy of the Chamber, as sent to its members in the referendum, is based upon conclusions reached by six composite committees, which made an exhaustive study of various aspects of the transportation problems during the past year, and upon the conclusions of the National Transportation Conference here last January, under the auspices of the Chamber.

The fourteen recommendations represent the first attempt that has been made to formulate a policy covering all three agencies of transportation—the railways, the highways and the waterways. They are the result of deliberations in which shippers and carriers, representatives of agriculture, industry, mining, banking, insurance and commerce have participated as members of the committees which made the preliminary studies and of the Transportation Conference which considered them.

Wells Placed in Hands of Temporary Receiver

SPRINGFIELD, MASS., March 26—Charles H. Keith has been named temporary receiver for the Wells Corp. of Greenfield, Mass., by the Superior Court sitting here. A statement given out by the company says that assets exceed liabilities by several hundred thousand dollars.

On a bill of equity brought against F. O. Wells, head of the Wells Corp. by the Central Union Trust Co. of New York, in relation to \$36,000 in notes given by the Fisher Distributing Corp. of Detroit and indorsed by him, the defendant is temporarily enjoined from selling or transferring stock in F. O. Wells, Inc., W.I.C.O. Electric Co. and certain other concerns.

Mr. Wells, former head of the Greenfield Tap & Die Corp., formed the Wells Corp. last year, merging with the American Tap & Die Co., F. O. Wells, Inc., and the Williamsburg Manufacturing Co.

First Report Issued by Safety Committee

Analysis Is Made of 596 Accidents Reported for First
Two Months of Year

NEW YORK, March 26—Chairman George M. Graham and his fellow members of the Traffic Planning and Safety Committee of the National Automobile Chamber of Commerce, A. B. C. Hardy, Edward S. Jordan, Alvan Macauley and George H. Pride, are demonstrating that through cooperation with the daily newspapers it is possible to compile intelligent figures as to automobile fatalities.

Analysis of these figures shows the fundamental causes of accidents and makes possible the formulation of plans by the committee to make the streets and highways safer for both pedestrians and motorists.

Newspapers Cooperating

First results of the campaign of compilation that the committee is carrying on are shown in the report issued today from N. A. C. C. headquarters by Secretary John C. Long. This report is based on the fatalities of the first two months of 1924 as reported to the committee by the 114 daily newspapers in forty-seven States and interested organizations which are cooperating with the committee.

The report shows that in January and February there were 596 motor vehicle accidents, a figure, however, that is not final, for a number of States and cities are not yet ready to release their totals. The count, nevertheless, is sufficient to enable the committee to analyze causes, this analysis showing that speeders were responsible for forty-eight of the deaths and skidding for thirty-three. The great bulk of the accidents were those in which the motor vehicle struck the pedestrian, 280 fatalities of this type being reported. In 130 of these cases the person struck was jay-walking or otherwise violating traffic regulations.

150 Children Killed

The committee finds that 150 children were killed on the highways in the two months, which, it says, points to the need for better guardianship of child life. Twenty of these cases were due to coasting on the streets, which demonstrates the need for setting aside streets for play, if more playgrounds are not available, and the necessity for safety education in the schools.

Vermont leads the nation in traffic safety, the committee reports, not one automobile fatality having occurred in the State during the first two months of 1924. Ten cities also have clean records: Astoria, Ore.; Bangor, Me.; Clarksburg, W. Va.; Evanston, Ill.; Haverhill, Mass.; Lincoln, Neb.; Nashua, N. H.; Pueblo, Col., and Springfield, Ill. New York had the greatest number of automobile fatalities, 120. Chicago had 69; Los Angeles 45, Philadelphia 43, and Detroit 34.

Overseas Shipments of Cars Still Mount

During February 13,329 Were
Exported Compared with
12,614 in January

WASHINGTON, March 26—Reports of the Automotive Division of the Bureau of Foreign and Domestic Commerce show that passenger car exports continued their upward trend during February. An advance is shown over January shipments, which exceeded those of the preceding December and of January of 1923 by a substantial figure. A marked increase over February of last year is indicated.

In the first two months of this year, according to the records of the division, there have been 25,943 passenger cars exported compared with 14,891 in the like period a year ago.

During February, 13,329 passenger cars were shipped overseas as against

12,614 in January and 8,851 in February of 1923. Truck exports declined somewhat from the January total. In February they aggregated 1704 compared with 2845 in January and 1698 in February of last year. Details of the shipments are given in the table published below.

Tax Collections Fell from February of 1923

WASHINGTON, March 25—Collection of excise taxes from the automobile industry during February, 1924, totaled \$9,856,363, compared with \$10,073,139 in February, 1923, representing a decrease of \$216,776.

The excise tax figures for the eight months ending March 1, 1924, show that automobile manufacturers from July 1, 1923, to Feb. 29, paid a total excise tax of \$104,622,648, against \$89,515,620, collected for the corresponding period of 1923.

Figures of the Internal Revenue Bureau for February this year show the collected tax on automobile trucks and

wagons as being \$887,360, compared with revised figures for February, 1923, on the same items of \$710,017. On automobiles and motorcycles, February, 1924, the collected tax was \$6,839,030, contrasted to \$5,886,852, and on automobile accessories and parts in February, 1924, \$2,129,971, compared with February, 1923, of \$3,476,269.

Compared with other industries, the automobile industry, with one exception, pays the largest excise income tax. The exception in February was the tobacco industry, paying a tax of \$24,348,000; automobiles, \$9,856,363; theatres, \$6,738,627 and jewelry, watches, etc., \$2,674,502.

SERVICES FOR C. W. NICHOLS

DETROIT, March 22—Services for Charles W. Nichols, a director and counsel for the Motor Wheel Corp. and the Duplex Truck Co. and attorney for Olds Motors Works, were held in Lansing this week. Mr. Nichols was one of the leading members of the Lansing bar. His death followed a short illness from pneumonia.

Exports, Imports and Reimports of the Automotive Industry for February of Current Year and Total of Twelve Months Ending February 29, 1924

	Month of February 1923		Month of February 1924		Twelve months ending February, 1924		Twelve months ending February, 1923	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles, including chassis.....	10,568	\$7,394,747	15,037	\$11,043,904	60,646	\$44,539,316	105,992	\$76,419,805
Electric trucks and passenger cars.....	19	19,723	.....	.....	214	272,828	92	128,530
Motor trucks and buses, except electric:								
Up to 1 ton.....	1,302	467,451	632	287,204	7,369	2,724,612	12,210	4,978,395
Over 1 and up to 2½ tons.....	322	439,494	302	431,165	1,956	2,380,060	2,880	3,696,868
Over 2½ tons.....	74	186,265	126	291,403	467	1,327,539	940	2,381,714
Total motor trucks and buses, except electric	1,698	1,092,400	1,704	1,507,277	9,792	6,432,211	17,828	12,142,569
PASSENGER CARS								
Passenger cars, except electric:								
Value up to \$500, inclusive.....	3,068	1,045,880	5,041	1,845,281	5,167	1,710,117	34,265	12,418,499
Value up to \$800.....	2,918	1,930,058	3,787	2,521,829	27,338	14,281,691	22,547	14,895,344
Value over \$800 and up to \$2,000.....	2,652	2,746,044	4,239	4,449,297	16,683	17,821,559	29,298	31,340,299
Value over \$2,000.....	213	560,642	262	710,764	1,452	4,020,910	1,927	5,408,760
Total passenger cars, except electric.....	8,851	6,282,624	13,329	9,527,171	50,640	37,834,277	88,037	64,062,902
PARTS, ETC.								
Parts except engines and tires*.....	333,133	51,445	583,561	112,886	79,316,512	18,618,812	9,777,330	1,731,300
Automobile unit assemblies*.....	19,496,252	4,529,255	.....	.....	575,898	107,801	125,203,670	27,913,939
Accessories, parts*.....	34,263	22,178	252,475	98,133	63,203	35,052	2,111,274	1,001,043
Automobile service appliances (not elsewhere specified)*.....	26	4,055	5	4,051	90	63,918	149	91,754
Station and warehouse motor trucks.....	237	94,895	20	5,664	548	222,547	342	107,209
Tractors (trailers).....	2	5,802	13	51,000	26	335,612	49	294,421
Airplanes.....	6,520	6,193	16,172	5,517	360,884	223,598	209,433	49,961
Parts of airplanes, except engines and tires*	.....	.....	.....	.....	.....	.....	.....	.....
BICYCLES, ETC.								
Bicycles and tricycles.....	879	11,208	915	9,265	12,278	100,089	16,357	160,720
Motor cycles.....	1,954	444,952	2,010	504,973	11,175	2,627,102	13,843	3,465,704
Parts, except tires*.....	270,846	128,705	323,015	153,714	1,737,423	908,846	2,228,112	1,167,378
INTERNAL COMBUSTION ENGINES								
Stationary and portable:								
Diesel and semi-Diesel.....	82	19,250	148	12,777	481	206,137	599	183,953
Other stationary and portable.....	1,968	143,590	1,485	126,011	14,729	1,781,589	17,115	1,548,849
Not over 8 H.P.....	183	76,616	229	103,611	3,883	296,717	2,064	1,147,608
Over 8 H.P.....	.....	.....	.....	.....	280	186,378	.....	.....
Automobile Engines.....	5	1,171	494	39,473	15,619	1,910,857	964	97,306
Motor trucks and buses.....	1,735	263,414	3,554	521,131	23	9,333	18,124	2,704,833
Passenger cars.....	12	1,392	10	4,999	2,753	408,733	1,518	386,959
Tractors.....	1	12,000	23	46,100	24	7,832	99	114,331
Aircraft.....	445,427	223,068	806,958	327,293	63	37,690	5,236,174	2,284,385
Accessories and parts*.....	.....	.....	.....	.....	4,200,877	1,798,348	.....	.....
IMPORTS								
Automobiles and chassis (dutiable).....	17	42,025	25	35,396	353	565,494	610	540,250
Other vehicles and parts for them (dutiable).....	.....	149,582	.....	128,479	.....	548,791	.....	1,079,099
REIMPORTS								
Automobiles (free from duty).....	457	548,872	20	19,761	1,971	2,623,440	300	464,718

*Pounds.

Manufacturers Form Battery Association

**D. H. Kelly Is Elected President
at Organization Meeting
Held in Chicago**

CHICAGO, March 25—Eighteen battery manufacturers were represented at the organization meeting of the Battery Manufacturers Association held at the Congress Hotel. The need of supporting the battery dealer in constructive merchandising methods was the key note of the meeting, the basic idea of charging for battery service being unanimously favored.

To attain this ideal in the individual battery shop, it was also brought out that local associations of battery men should be fostered and that advertising copy directed to the dealer should deal with this question, while advertising to the car owner should serve to educate the public to pay a fair price for good service rendered.

A resolution was passed requesting the management of the National Automotive Service Convention to set aside one day of the May meeting in Detroit for the discussion of problems relating to electrical service.

A membership committee was appointed and their recommendation as to membership was approved. Active members shall be those manufacturers who actually make plates and assemble them into completed storage batteries. Associate members shall be composed of manufacturing companies allied with the storage battery industry, not eligible to active membership.

The following officers were elected: President, D. H. Kelly, U. S. L. Battery Corp.; first vice-president, R. B. Crane, Cooper Storage Battery Corp.; second vice-president, R. D. Mowry, Universal Battery Co.; treasurer, T. A. Bartlett, Cole Battery Corp.; secretary, C. A. Englert, Englert Manufacturing Corp., and directors, F. V. Brown, Amplus Storage Battery Co., and A. R. Campbell, Wright Battery Co.

Ames Holden Tire Report Shows Deficit for Year

MONTREAL, QUE., March 25—In spite of a 13 per cent increase in sales volume last year, profits of the Ames Holden Tire & Rubber Co. were considerably curtailed due to competitive conditions in the industry. The trading profits for the year amounted to \$103,102 which through deductions was reduced to a deficit of \$39,464. The profit and loss surplus at the time of organization amounting to \$25,915 was applied against this deficit, leaving a debit balance of \$13,458.

Current assets are reported at \$266,388 in excess of current liabilities. The balance sheet for the first year since the company's reorganization shows total

assets of \$1,960,679. Accounts receivable total \$75,552. Among the liabilities, income bonds are shown at \$1,048,000, and first mortgage bonds at \$250,000. Accounts payable stand at \$161,097. Customers' paper under discount and other contingent liabilities amount to \$26,549.

President A. J. Nesbitt states that in view of conditions prevailing during the past year, the directors regard the earnings for the year as not unsatisfactory. He says:

Inventories are current, commitments favorable, merchandise turnover adequate and the company's working capital improved over the beginning of the year, while bank loans, which in June stood at \$300,000, fell to \$19,000 at the close of the year's operations. While 1924 is expected to see a continuation of intense competition, with minimum prices, your directors look forward to a not unprofitable year.

Tire Makers Ask Dealers to Give Data on Stocks

NEW YORK, March 24—Carrying out its plan of inventorying the stocks of the retailers, the Rubber Association of America has sent a questionnaire to 120,000 tire dealers asking for authentic data as to the number of pneumatics and solids and inner tubes on their shelves. It is expected that all of the returns will be in by April 10.

Approved by the National Automobile Tire Dealers Association, which is cooperating with the Rubber Association, this statistical activity should be of material assistance to manufacturers in enabling them to plan their production schedules. When the new system is working and quarterly reports secured, comparisons will be possible that will benefit both maker and dealer.

In the questionnaire sent out the tire dealer is asked to report not only his stock on hand but also inform the Tire Manufacturers Division, which is conducting the survey, if accessories are also sold; if gasoline and oil are handled; if general hardware is sold; if automobiles are sold; if tires are vulcanized and if tires and tubes constitute the major part of the sales.

Salesmen First in List of Paige-Jewett Buyers

DETROIT, March 25—Sales of Paige and Jewett cars in February, according to occupational classification of buyers, show salesmen leading, with 11 per cent of the total. Mill workers, machinists, mechanics, etc., are the second largest purchasers, with 10.5 per cent. Percentage of sales listed as going to farmers is 4.6 per cent, this being eighth on the list. Other buyers are classified as follows:

	P.C.		P.C.
Executives	6.7	Civil Service.....	1.9
Merchants	6.6	Taxi-Livery	1.9
Real Estate.....	6.5	Oil	1.6
Building Trades..	6.3	Garage Men.....	1.6
Women	5.4	Bankers-Brokers..	1.4
Physicians	3.7	Bakers .....	.9
Clerks	3.3	Lawyers .....	.7
Groceries-Meats..	2.7	Teachers-Clergy..	.5
Railroad Men....	2.6	Drugs .....	.4
Engineers	2.6	Miscellaneous ...	4.3
Hotel-Restaurant	2.3	Occupation not	
Retired	2.2	given	7.8

Activities Extended by American Bosch

**Has Added Production of Starting
and Lighting Units in Last
Four Months**

SPRINGFIELD, MASS., March 24—Analyzing the annual report of the American Bosch Magneto Co. for 1923, which shows net profit of \$94,075 in comparison with \$2,332 in 1922, President A. T. Murray announces that the value of the company's various products—magnetos, battery sets, motors and starting and lighting motors—was \$10,081,439 in 1923, against \$7,621,240 the preceding year.

This represents the manufacture of 137,123 magnetos, 234,891 battery sets, 146,622 motors and 150,337 starting and lighting generators. An appreciable increase in production over 1922, when the figures were 81,098, 94,763, 97,370 and 104,587 respectively.

Mr. Murray, in his letter to stockholders, tells how the company has altered its manufacturing policies in the last three years, in which time it has added battery ignition and starting and lighting to its magneto business, which formerly was its only activity. This change has greatly broadened the company's prospective market.

"During the last four months we have added the production of starting and lighting units to our other activities," says President Murray. "Heretofore, all of the Bosch starting and lighting units were manufactured by Gray & Davis, the Bosch company receiving a commission for the sale of these units. In addition to this, we are now manufacturing starting and lighting units at Springfield, and this branch of our activities indicates satisfactory possibilities."

Paige Officials Visit States and Make Report

DETROIT, March 26—A summary of reports by Paige-Detroit Motor Car Co. executives in several sections of the United States indicates general prosperity in 1924, says H. M. Jewett, president. Vice-president F. L. Jewett, who is on the Pacific Coast, reports that business in that section is booming, and S. L. Depew, controller of the company, after examination of conditions in the trade territories of New York, Boston and Philadelphia, declares that the outlook is excellent.

Henry Krohn, vice-president in charge of sales, after a tour of the Central West, says that, while business will not reach boom proportions due to wheat prices and market conditions, it will double last year's.

C. B. Gaunt, following a trip South, reports conditions improved generally in that section, and that better prices for cotton, tobacco and other products have opened up a good market for cars.

Freight Rate Relief Denied 3 Shippers

Interstate Commerce Commission Refuses to Make Reductions to Pacific Coast

WASHINGTON, March 26 — Complaints of the Moreland Motor Truck Co., Chevrolet Motor Co. and the Fageol Motors Co. that freight rates from the East to the Pacific Coast were prejudicial to their interests have been dismissed by the Interstate Commerce Commission which has refused to reduce various commodity rates affecting parts used by the western plants of these companies.

The concerns having plants at Burbank, Oakland and San Francisco, charged that they were forced to pay a prejudicial rate on gasoline engines and motor truck axles in carload lots from points in Pennsylvania, Ohio, Michigan and Wisconsin consigned to California destinations.

Cite Panama Canal Rates

They declared that from 60 to 75 per cent of the west-bound movement of motor truck engines and axles move through the Panama Canal under a commodity rate of \$2.35 per cwt. and asked that the rail rates on these commodities be equalized with the water rates.

The companies stated in their bill of complaint that not only are the rail rates too high but are changed so frequently as to be hard to keep track of. On March 15, 1918, the rate on gasoline engines and axles was \$1.92 from New York, \$1.87 from Buffalo, \$1.82 from Detroit, and \$1.77 from Chicago. On June 25, 1918, the rates were increased to \$3.20, \$3.12, \$3.035, and \$2.955 respectively. On July 1, 1922, the rates were reduced to \$2.88, \$2.81, \$2.73, and \$2.66 respectively.

This last rate the companies contended is fair and is in line with the water-rates. Under the last named rate, however, the Commission at that time designated a minimum car load as being 30,000 lb., which in actual application, the companies pointed out, results in a freight rate in excess of \$3.035 per cwt.

Ask Lower Carload Weight

The plea of the manufacturers was that the minimum car load weight be reduced, or that the rate be lowered if the 30,000 lb. minimum must prevail. They pointed out that on June 1, 1922, a rate of \$2.61, minimum 30,000, was established on machinery from points in the Cincinnati, Ohio group, including Detroit, and that this rate was further reduced to \$2.35 on Nov. 30, 1922.

In ruling unfavorably against the three companies the Interstate Commerce Commission declared that the rail rates could not be made competitive with the water rate through the Panama Canal and that the increases in rates on their commodities were no greater than on those made on many other water competitive articles.

GOVERNMENT FILMS STORY OF BATTERY

WASHINGTON, March 26—The principles of operation of the automobile storage battery have been explained in a new industrial motion picture, prepared under the direction of the Department of Interior, with the cooperation of the Willard Storage Battery Co.

The film, known as "The Story of a Storage Battery," illustrates vividly all details in the construction, its workings and its proper care. The film will be loaned free by the U. S. Bureau of Mines, upon request to the Bureau of Mines Experiment Station. It will be available for release after April 1.

In dismissing the complaint, and denying the relief sought, the Commission compared the earnings per car and per car-mile under the present rates with earnings under the rates on machinery, structural steel, and similar commodities and declared there was no discrimination against the truck manufacturers who lodged the complaint.

Fred Van Sicklen Dies; Was Long in Industry

CHICAGO, March 22—Fred Van Sicklen, brother of Norton H. Van Sicklen, vice-president and general manager of the Apperson Bros. Automobile Co., died here last evening.

Mr. Van Sicklen was one of the best known men in the automotive industry and devoted the greater part of his time to automotive advertising. He was star advertising man with Motor Age back in the days of 1905.

He was connected at one time with the Critchfield Advertising Agency at Detroit and later on formed the Murray-Van Sicklen Co. of Chicago.

For several years Mr. Van Sicklen has devoted most of his time to the selling of motor cars, particularly Fords. His last connection was with the Bunnell Motor Co., Ford dealer at Gary, Ind. Mr. Van Sicklen was about 55 years old.

Hoepli Will Represent Argentina at Congress

WASHINGTON, March 25—The appointment of M. H. Hoepli, assistant chief of the Automotive Division of the United States Department of Commerce as an honorary life member of the Argentina Touring Club is announced. The club has a membership of more than 10,000 active members.

The purpose of the appointment, the Government has been advised, is that he may be one of the three representatives of that organization to attend the World Motor Congress at Detroit in May, as an official accredited representative of the Argentina Touring Club.

Disadvantages Seen in Using U. S. Boats

Traffic Managers Not Enthusiastic Over Interstate Commerce Commission Order

DETROIT, March 24—Enforcement of section 28 of the shipping act under an order issued by the Interstate Commerce Commission, effective May 20, held the attention of traffic managers of the automobile industry at their monthly meeting here.

Under this order, which covers all commodities except grain, the railroads are required to correct tariffs, making rates to seaboard on exports lower than on domestic traffic. The lower export rate is to apply only when it is shown that shipments actually go aboard American vessels. If shipped on foreign vessels the higher domestic rail rates and port charges are to apply. Owing to boxing and heavy loading of automobiles for export, the rail rates are on a lower basis than for domestic shipments.

Fear Hampering of Shipments

While the meeting appreciated the stated purpose of this law to develop American shipping through preferential rail rates, doubt was expressed that this result would follow; furthermore, that the service required for American exports of automobiles, if they were confined to American ships, would be seriously hampered. The matter is deemed of great importance in view of efforts now being made to develop the foreign trade of the industry.

Reports indicate that shipping interests generally throughout the country are very much aroused over the enforcement of this section and that while the Shipping Board indicates ability to handle American exports, it is felt that in actual practice American manufacturers would find themselves considerably hampered in getting the required service and in having a choice of sailings so as to take advantage of prompt dispatch from seaboard in either foreign or American ships.

Special Committee Named

E. N. Hodges, Hupp Motor Car Corp., P. G. Findlay, Dodge Brothers and M. Goetchius, General Motors Export Co., were appointed a special committee to give the question further consideration.

Production reports indicate that the industry is continuing during March the heavy production reported in February.

The following companies were represented at the meeting:

Bulek, Cadillac, Chevrolet, Dodge Brothers, Durant, Flint, General Motors Truck Co., Haynes, Hupp, Lincoln, Maxwell, Oakland, Paige, Pierce-Arrow, Reo, Studebaker, Willys-Overland and White; also Alfred H. Swayne, vice-president General Motors Corp.; H. Deuster, Motor and Accessory Manufacturers Association and J. S. Marvin of the National Automobile Chambers of Commerce, chairman of the Conference.

Men of the Industry and What They Are Doing

Courtney Johnson Joins Gardner

Courtney Johnson has resigned as assistant general manager of the Dort Motor Car Co. to join the Gardner Motor Co., Inc. Mr. Johnson has been connected with the Dort company for nine years, becoming assistant general manager about a year ago. His successor at the Dort plant has not yet been selected.

Kelvie Manages Flint Branch

Russell M. Kelvie, assistant to General Manager N. H. Van Sicklen of the Apperson Brothers Automobile Co., has resigned to become manager of the Minneapolis branch of the Flint Motor Co. Mr. Kelvie had been with the Apperson company for twelve years and during the last three years has had charge of advertising in connection with his duties as assistant to the general manager. As factory sales manager he had charge of distribution.

Changes with Lees Bradner Co.

Glenn Muffly has resigned as sales manager of the Lees Bradner Co. of Cleveland and will open his own office in Chicago to do consulting work in the building and distribution of automotive and mechanical products. He will continue to act as counsel for the Lees Bradner Co. Ira D. Grove will succeed him as sales manager. For the last ten years, Mr. Grove has been connected with the Landis Tool Co. as sales representative in the Detroit and Cleveland territories. D. D. Button, formerly consulting production engineer at the Muncie Products Division of the General Motors Corp., has taken up his duties as works manager of the Lees Bradner Co.

Parker Organizes Company

John E. Parker, formerly factory manager of the Spencer-Smith Machine Co., has organized a company to take over the American Bell & Foundry Co., Northville, Mich., the new company to be known as the Bell Furnace & Manufacturing Co. Mr. Parker has been identified with the industry from its earliest days, having been connected with Maxwell-Briscoe, Dayton Engineering Laboratories Co. and Olds Motors Works.

Haid Is Victor Motors Official

George F. Haid has resigned the city counselorship of St. Louis to become vice-president of Victor Motors, Inc., maker of the Victor line of trucks in that city.

Baughman Is Southeastern Agent

E. H. Baughman has been appointed southeastern representative of the Cincinnati Ball Crank Co., with headquarters in the Bona Allen Building, Atlanta,

Ga. Mr. Baughman for ten years was vice-president and general manager of the Ozburn & Asbestos Co. of Atlanta and for two terms served as president of the Southern Equipment Jobbers Association.

Garrick Elected Auditor

James H. Garrick, formerly head of the factory planning department of the defunct Mitchell Motors Co., Racine, Wis., has been elected to the new position of general auditor of the Racine Horseshoe Tire Co., Racine. He has been manager of the cost department for some time.

Widkow with Keystone Forging

Fred C. Widkow, formerly eastern sales manager of J. H. Williams & Co., has been named eastern sales manager of the Keystone Forging Co. of Northumberland, Pa. He will be in full charge of the sales in both the special and standard forging departments for the eastern division and will make his headquarters at the plant.

T. S. Overman Resigns

T. S. Overman has resigned as superintendent of the Detroit Gear & Machine Co. In the future, C. Burke, formerly assistant superintendent, and A. Schiller will each have charge of a number of departments.

Freeman Is Hupp Engineer

L. C. Freeman, formerly executive engineer of the Maxwell and Chalmers companies, has joined the Hupp Motor Car Corp. engineering staff. Mr. Freeman's resignation from the Maxwell and Chalmers companies became effective several weeks ago.

Carter Associated with Erickson Co.

Zenas W. Carter, who has completed the special bus promotion program of the White Motor Co. is now associated with the Erickson Co., New York advertising agency.

Pendock Addresses Students

Charles W. Pendock, president and general manager of the LeRoi Co., manufacturer of gasoline engines, Milwaukee, addressed the student agricultural engineers of the University of Wisconsin on "Gas Engine Design and Operation" at their March session at Madison.

Simonds Succeeds Anderson

J. E. Simonds, formerly Chicago branch manager of the Duplex Engine Governor Co. of Brooklyn, has assumed charge of the Detroit branch, succeeding C. A. Anderson, resigned.

Nearly 110,000 Tires Made Daily in Akron

Greatest Increase Is in Larger Sizes and Balloons, Latter Reaching 6000

AKRON, March 25—The last few weeks have witnessed a gradual climbing in the production figures of many of the tire companies here, and output closely approaches the 110,000 a day mark which the Akron district produced at about this time last year.

While all production has been mounting, the largest percentage increase in production lies in the balloon tire and the larger sizes.

It is reported that the balloon tire output is well over the 6000 tire a day mark for the entire industry, while the output of this type was in the neighborhood of 3500 a day two months ago.

Increased demand for pneumatic truck and bus tires has been responsible for a constant increase in the production of the larger size tires. It is estimated that the large tire consumption is 25 per cent greater than a year ago.

Committee Tells Views on Merchant Marine Act

WASHINGTON, March 26—Representatives of the National Automobile Chamber of Commerce in the form of a special committee made up of export managers and including James S. Marvin, manager of the Traffic Department of the N. A. C. C., appeared before the Shipping Board today to discuss Section 28 of the Merchant Marine Act. The committee was of the opinion that under the Act American bottoms would not be able to care for the business.

In reply Edward P. Farley, chairman of the Shipping Board, declared that if there are any ports to which the automobile industry ships goods where the Board does not have a service, that such a service will be installed. With this assurance the automobile men will meet the Board's traffic department chief tomorrow to outline their needs.

Clucas Moves Offices

William J. Clucas, district manager of the Lancaster Steel Products Corp., a General Motors subsidiary, has moved his office from Buffalo to the Leader Building, Cleveland.

Federal Appoints Ingersoll

George B. Ingersoll, a member of the firm of Ingersoll & Allen, patent attorneys, has been appointed chief engineer of the Federal Motor Truck Co., Detroit.

Store Door Delivery Survey Is Completed

American Railway Express, However, Denies Planning to Handle All Business

NEW YORK, March 26—Officials of the American Railway Express Co. deny reports that the company in conjunction with railroad interests is planning the formation of a nation-wide company which would take charge of all of the less-than-carload freight handled by the different railroads in various cities of the country, and which would mean that hundreds of existing trucking concerns which are doing this work would have to look elsewhere for business.

These reports originated in a very complete history of the store door movement which was completed a month ago by a committee of American Railway Express Co. officials. The purpose of the report was to provide the express company with all information relative to store door delivery or l. c. l. freight in those places in the United States where it is practiced and in England and Canada.

Report Was For Company's Use

It was not intended that the report should be made public, but rather it was to serve for the express company's own purposes.

While the report implies that if the store door delivery system of handling l. c. l. freight is adopted, the most efficient way to operate it would be to have one national organization that could function in this capacity throughout the entire country, the report does not contain any recommendations to the effect that the American Railway Express Co. should take on work of this character or that steps leading to that end should be taken. The report is merely one of information and no action on it has been taken by the officials of the express company, nor is it known whether any such action will ever be taken.

The express company states that in making the investigation, which is extended over a period of one year, it is but making its own investigation on a movement that has been discussed by the railroads and all traffic organizations more or less generally since the fall of 1917.

Railroads Want Trucking Done

During the last two years many of the railroads have expressed themselves as favorable to store door delivery, but have gone on record as stating that the railroads themselves are not desirous of going into the trucking field. A few of them have expressed the view that store door delivery should be handled by some large national concern capable of functioning in all of the cities and towns where needed.

The thoroughness with which the

BUSINESS OF M. A. M. A. MEMBERS IN FEBRUARY REACHED TOTAL OF \$47,875,000

NEW YORK, March 26—Reports from members of the Motor and Accessory Manufacturers Association show that sales in February decreased 6.18 per cent from the January total—\$47,875,000 in comparison with \$51,028,000. This February showing, however, is about on a par with the corresponding month last year, when the equipment manufacturers were at their peak.

Collections continue to be excellent, February's past due accounts showing a decrease of 3.59 per cent from January, while notes outstanding increased 10.88 per cent.

The following table presents the sales by members of the association, the total past due accounts and notes held for 1923 and the first two months of 1924:

	Total Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
1924						
January	\$51,028,000	17.87 Inc.	\$1,698,500	39.23 Dec.	\$744,950	14.82 Dec.
February	47,875,000	6.18 Dec.	1,637,524	3.59 Dec.	826,000	10.88 Inc.
1923						
January	45,451,950	30.94 Inc.	2,469,950	29.33 Dec.	1,945,850	2.11 Inc.
February	48,518,700	6.75 Inc.	2,741,100	10.82 Inc.	1,981,950	1.86 Inc.
March	59,428,800	22.49 Inc.	2,129,350	22.32 Dec.	1,929,300	2.66 Dec.
April	61,647,050	4.00 Inc.	3,313,150	8.05 Inc.	1,839,350	5.00 Dec.
May	58,409,550	5.25 Dec.	1,982,750	14.28 Dec.	1,140,150	38.00 Dec.
June	58,067,500	.059 Dec.	2,191,150	10.55 Inc.	1,111,970	2.47 Dec.
July	48,536,700	16.40 Dec.	2,313,400	5.60 Inc.	1,424,450	28.10 Inc.
August	50,264,100	3.50 Inc.	2,382,370	7.00 Inc.	1,132,250	20.00 Dec.
September	46,222,650	8.04 Dec.	3,583,000	50.39 Inc.	1,322,550	16.80 Inc.
October	53,803,350	16.50 Inc.	2,857,450	20.00 Dec.	1,094,500	17.00 Dec.
November	51,634,670	4.20 Dec.	2,524,850	13.17 Dec.	1,163,800	5.95 Inc.
December	43,289,950	17.00 Dec.	2,795,300	11.00 Inc.	874,550	25.00 Dec.

American Railway Express Co. has carried out its investigation is shown by the personnel of the committee, which is as follows: J. F. Baker, general manager, of Los Angeles; W. E. Beckner, general manager, Cincinnati; H. E. Cartwright, assistant to the vice-president, New York City; C. L. Chase, general manager, St. Louis; L. R. Gwyn, special assistant to the president in New York City, and W. W. Owens, general manager, Washington.

Winton May Build Car Having Diesel Engine

CLEVELAND, March 25—Alexander Winton, producer of the Winton prior to the discontinuance of manufacturing operations, may re-enter the production field with a car equipped with a Diesel type engine and selling at a much lower price than the old Winton, according to reports here. Mr. Winton and his family went to New York for a short vacation the third week in March, and his plans are not likely to be announced before his return.

The Diesel engine works of the Winton Co. has not been affected by the difficulties of the automobile company, and Mr. Winton, it is reported, is interested in attempts that are being made to adapt the Diesel type of poppet valve engine, successfully used in motor boats, to the automobile.

MACK TO INCREASE STOCK

NEW YORK, March 27—Stockholders of Mack Trucks, Inc., have authorized an increase in the company's authorized common stock from 320,000 to 500,000 shares. At the annual meeting, held yesterday, all retiring directors were re-elected.

Each Balloon Maker to Issue Own Table

NEW YORK, March 26—At a meeting of the executive committee Tire Manufacturers' Division, Rubber Association of America, held here today, it was decided that no table of inflation pressures for balloon tires will be issued by the association.

Each manufacturer will be expected to prepare his own table, based on the deflection of the tire for the particular load it carries. The recommended deflection probably will be 22 per cent. This action is understood to have become necessary because one of the large tire manufacturers favors a six-ply tire, which requires a higher inflation pressure than the four-ply balloons which most other tire makers are marketing.

It has been tacitly agreed that a 90-day limit will be placed on the standard guarantee for balloon tires, but details of this plan are not yet settled and the plan is subject to approval by all members of the Tire Manufacturers' Division.

Rims and Balloon Tires Discussed by Willshaw

BUFFALO, March 24—Harry Willshaw of the Dunlop Tire & Rubber Co. read a paper on the relation of drop base rims to the balloon tire at the meeting of the local section of the Society of Automotive Engineers here this evening. Lighter weight, lower cost, one-piece construction and ease of tire changing, are among the advantages claimed.

Much time was spent by those present in examining rims of this type and tires made to fit them.

General Motors Sees No Saturation Point

*With Completion of Projects
Under Way It Will Have
1,300,000 Capacity*

(Continued from page 736)

results in more effective handling of capacity already created.

The net increase in reserve for plant depreciation and obsolescence was \$12,420,896. The difference between the total (\$27,294,000) and the increase in depreciation reserves (\$12,420,896) or \$14,873,104, represents the additional amount of capital permanently invested.

The corporation at the close of the year was employing \$438,526,676 net capital, an increase of \$32,566,951, as compared with the corresponding period of the previous year.

For the first time the annual report deals specifically with its investments in affiliated and miscellaneous companies. This total is \$60,796,034 and consists of securities of companies not consolidated in the accounts of the corporation. A schedule of these investments and the value at which they are carried on the books of the corporation follow:

	Shares	Common Investment
Fisher Body Corp.....	360,480	\$32,151,825
General Motors Acceptance Corp.....	60,000	7,500,000
General Motors Building Corp.....		7,929,834
Investments in housing facilities.....		8,297,309
Managers Securities Co....		1,377,500
General Leather Co.....	10,000	1,250,000
Doehler Die-Casting Co..	4,000	800,000
	Preferred	
Doehler Die-Casting Co..	4,000	200,000
Miscellaneous.....		1,289,565
Total investment.....		\$60,796,034

The record of earnings for the fifteen years of operation shows that in that time net sales reached the total of \$3,690,240,502, with net earnings of \$311,048,655. Preferred dividends have amounted to \$40,058,863, and common dividends to \$270,989,792. Cash dividends to the amount of \$122,327,219 have been paid on the common stock, while \$148,662,573 of earnings have been re-invested in the business.

Housing Subsidiaries Formed

The demand for houses for employees has been such as to cause the corporation to create four housing subsidiaries at different points and to make investments in two additional companies for the purpose of meeting the demand for homes. During the year the investment in these properties has not materially altered, except that, through arrangements made with the Prudential Insurance Co., \$2,750,000 was borrowed and used to repay in part the General Motors Corp. for advances made.

Discussing the realigning of the products during 1923, in order to prevent price conflicts among the various car manufacturing units, the report states

G. M. C. REPORTS CURRENT ASSETS OF \$219,901,286 AND CURRENT LIABILITIES OF \$79,150,704

NEW YORK, March 26—The condensed consolidated balance sheet of the General Motors Corp. as of Dec. 31, 1923 and 1922 is as follows:

ASSETS		
	Dec. 31, 1923	Dec. 31, 1922
Current and Working Assets:		
Cash in banks and on hand.....	\$47,069,804.57	\$27,872,722.92
United States Government Bonds.....		3,950.00
Marketable securities.....	9,817.55	29,618.10
Sight drafts with bills of lading attached, and C. O. D. items.....	13,283,706.86	13,179,664.05
Notes receivable.....	3,452,273.91	4,455,042.33
Accounts receivable and trade acceptances, less reserve for doubtful accounts (in 1923, \$1,663,274.73; in 1922, \$1,431,143.55).....	15,820,019.32	15,921,934.93
Inventories at cost or market, whichever is lower..	138,678,131.38	117,417,823.05
Prepaid expenses.....	1,587,532.94	1,358,404.98
Total current and working assets.....	\$219,901,286.53	\$180,239,160.36
Fixed Assets		
Investment in affiliated and miscellaneous companies not consolidated.....	\$60,796,034.98	\$57,293,864.72
General Motors Corporation stocks held in treasury	5,046,322.62	3,275,432.65
Real Estate, plants and equipment.....	276,576,055.68	255,207,970.82
Deferred expenses.....	8,363,207.59	3,947,794.49
Goodwill, patents, etc.....	22,440,811.06	22,370,811.06
Total fixed assets.....	\$373,222,431.93	\$342,095,873.74
Total assets.....	\$593,123,718.46	\$522,335,034.10
LIABILITIES, RESERVES AND CAPITAL		
Current Liabilities:		
Accounts payable.....	\$40,299,518.04	\$34,812,441.20
Notes payable.....	10,000,000.00	
Taxes, payrolls and sundries accrued not due....	19,430,546.06	16,166,563.70
Federal taxes.....	8,272,586.05	1,650,821.93
Accrued dividends on debenture and preferred stock	1,148,054.71	1,133,096.23
Total Current Liabilities.....	\$79,150,704.86	\$53,762,923.06
Purchase money mortgages.....	\$1,218,055.20	\$1,279,750.12
Purchase money notes, account Fisher Body Corporation stock purchase.....		1,000,000.00
	\$1,218,055.20	\$2,279,750.12
Reserves:		
Depreciation of real estate, plants and equipment	\$63,248,803.25	\$50,827,907.11
Employees' investment fund.....	1,526,337.50	1,143,962.50
Sundry contingencies.....	7,538,435.54	7,016,667.35
Bonus to employees.....	1,914,705.69	1,344,098.70
Total reserves.....	\$74,228,281.98	\$60,332,635.66
Capital Stock:		
Debenture stock 7 per cent.....	\$32,931,600.00	\$32,181,600.00
Debenture stock 6 per cent.....	60,801,000.00	60,801,000.00
Preferred stock 6 per cent.....	16,183,400.00	16,183,400.00
Common stock, no par value (at \$10 per share)....	206,463,270.00	205,577,500.00
Common stock (\$100 par value).....	700.00	700.00
Total capital stock.....	\$316,379,970.00	\$314,744,200.00
Interest of minority stockholders in subsidiary companies with respect to capital and surplus....	1,447,406.76	1,278,662.18
Surplus over and above \$10 per share of no par value common stock.....	120,699,299.66	89,936,863.08
Total Capital Stock and Surplus.....	\$438,526,676.42	\$405,959,725.26
Total Liabilities, Reserves and Capital.....	\$593,123,718.46	\$522,335,034.10

that this was an absolute necessity which manifestly resulted in a considerable loss in profits in the last half of the year. Continuing, the report states:

The development and bringing into production on a quantity basis of an entire line of new models by each of the motor car divisions, with the exception of Chevrolet, was an important undertaking. A considerable interval of time exists between the introduction of a new article into manufacture before a competitive cost can be obtained. This is particularly true with a complicated and highly technical product such as the modern motor car.

Moreover, in changing models, production must largely cease for a considerable interval which in turn means reduced sales. It is the policy of the corporation to maintain the present alignment of products, refining and improving in detail. With the possible exception, however, and then only in degree, of the lower price models, recognition of new technical developments affecting performance, cost of manufacture and improvement

in appearance, must be given proper weight and be recognized from time to time by changes of more or less major character.

On the other hand, it is not believed that it will be essential in any one year to make as complete a realignment of products as was required during the year 1922.

Highway Essay Contest Explained Over Radio

WASHINGTON, March 22—The contest now being conducted by the Highway Education Board among 200,000 school children for the Harvey S. Firestone Scholarship was explained this week via radio by Stephen James of the Highway Education Board.

The value of the Firestone scholarship is \$4,000 and will be the means of a university education for the pupil that writes the best essay on "The Relation of Improved Highways to Home Life."

Peruvian Sales Big on Eve of Carnival

Pre-Season Business Phenomenal
—Nothing Mars Good Outlook for Year

LIMA, PERU, Feb. 29 (by mail)—As February closed, the Carnival Holidays opened. Since the primeval methods of celebrating the carnival have been abandoned, the days preceding the event have come to be the second best selling automotive season in Peru, rivaled only by the period before the celebration of the national holidays of Peruvian independence, the last of July.

Sales of cars were phenomenal this pre-carnival season, in some cases stocks being exhausted. Tires and accessories enjoyed a like demand, and vulcanizing shops worked till one o'clock in the morning.

Nothing untoward has so far appeared to obscure the bright prospects of splendid automobile sales during the whole of the year 1924. The government recently has removed the duty on gasoline, which will at least prevent that liquid from going any higher in price, if it does not bring a decline.

Roads are being improved and business methods are being bettered. A spirit of cooperation on the part of automobile dealers is becoming manifest. The realization of the value of united effort to accomplish common ends, on the part of the motor trade in Peru, coupled with the increased prosperity of the country, is going to produce big results.

Exports and Imports High

The total exports and imports of Peru for 1923, though not officially published, will total at least Lp36,000,000 as against approximately 29,000,000 for 1922. This total is surpassed only by that of 1919 of 39,000,000, and that of 53,000,000 of 1920, the two largest in the history of Peru, made during the war period of inflated prices.

The exports and imports of Peru during 1923 are more than twice the total of the last year before the World War.

Export of automobiles and trucks from the United States to Peru during 1922 totaled 142. Exports and imports of automobiles and trucks in Peru during 1923 make easily the second largest year in the history of those lines in the country, being surpassed only by 1920.

With a favorable tariff, good general business condition, a realization of the value and need of a reasonably priced motor fuel, and the indications of the dawning of cooperative effort for common ends, the future of the automotive dealers in Peru is in their own hands.

CLIMAX ENGINEERING ELECTS

ROCK ISLAND, ILL., March 26—The annual meeting of the Climax Engineering Co., Clinton, Iowa, this week brought two new financial interests into the company, M. M. Cruise of Chicago and E. P.

BUSES TO SUPPLEMENT TROLLEYS IN CHICAGO

CHICAGO, March 26—Recognizing the growing importance of the motor bus as a factor in transportation, Chicago's city authorities have begun a series of conferences to evolve a definite policy respecting its regulation.

A comprehensive bus program is reported to be contemplated by the Chicago Surface Lines in connection with the operation of trolley cars. It is planned to connect street car lines with outlying districts by means of bus lines, thus meeting the private bus competition which carries much passenger traffic to steam railroad stations.

The Surface Lines, it is reported, intend to give transfers from buses to street cars and from street cars to buses. In this manner the Surface Lines would reduce daily transportation costs in some instances from around 50 cents to 14 cents, on a basis of two trips.

Denkman of Rock Island. Officers were elected as follows: George W. Dulany, Jr., Chicago, president; George W. Cravens, Clinton, vice-president and general manager; H. W. Seaman, Clinton, vice-president; E. P. Denkman, Rock Island, vice-president; M. M. Cruise, Chicago, treasurer, and Jennie M. Thomsen, Chicago, secretary.

Production Last Month Reached 367,435 Total

WASHINGTON, March 25—Figures compiled by the Department of Commerce show that during February of this year 367,435 passenger cars and motor trucks were produced in this country as compared with 316,148 turned out in January.

The following table shows the production by months for 1922 and 1923 together with that for January and February of this year:

Passenger Cars			
	1922	1923	1924
January	81,696	223,819	*287,302
February	109,171	254,773	336,363
March	152,962	319,770	.....
April	197,224	344,639	.....
May	232,462	350,410	.....
June	263,053	337,362	.....
July	225,086	297,330	.....
August	249,492	314,373	.....
September	187,694	298,911	.....
October	217,566	335,023	.....
November	215,352	284,923	.....
December	208,010	*275,439	.....

Motor Trucks			
	1922	1923	1924
January	9,576	19,720	*27,43
February	13,350	22,161	.....
March	20,022	35,260	.....
April	22,640	38,056	.....
May	24,097	43,678	.....
June	26,298	41,145	.....
July	22,046	30,663	.....
August	24,692	30,829	.....
September	19,462	28,638	.....
October	21,795	30,166	.....
November	21,949	28,070	.....
December	20,354	*27,743	.....

*Revised.

Illinois' Sales Fall but Indiana's Rise

Drop of 29 Per Cent in Former
State Last Month—22 Per Cent
Gain in Latter

CHICAGO, March 25—February passenger car sales in Illinois, as disclosed by figures on new car registrations, were 29 per cent lower than those of January. In Indiana, however, there was a 22 per cent gain. Each class in Illinois registered losses, while the reverse was true in Indiana. Many of the big Chicago distributors and dealers reported an exceptionally heavy demand during February, but this is not reflected in the registration figures because a considerable portion of the orders called for future delivery.

Losses in Illinois ranged from 21 per cent on Fords and other low priced cars to 44 per cent on the high priced vehicles. In Indiana the smallest gain registered was on low priced cars (excluding Fords), 4 per cent, to 38 per cent on those in the medium price class. Medium priced cars in Illinois showed a loss of 35 per cent.

Percentages of loss and gain in the various price classes follow:

	Illinois	Indiana
Fords	-21%	+15%
Low (Excluding Fords)	-21%	+4%
Medium	-35%	+38%
High	-44%	+16%
Total sales	-29%	+22%

Following are the detailed registration figures:

Illinois				
Month	Fords	Low Excl. Fords	Medium Price	High Price
January	4,101	2,187	5,871	1,013
February	3,201	1,724	3,762	567
Total	7,302	3,911	9,633	1,580

Indiana				
Month	Fords	Low Excl. Fords	Medium Price	High Price
January	4,106	1,007	1,259	104
February	4,748	1,353	1,743	121
Total	8,854	2,360	3,002	225

Illinois statistics were compiled from data furnished by Robinson's Advertising Service, Springfield, Ill. Indiana registrations were obtained from information supplied by the Indianapolis Automotive Trade Association, Indianapolis.

DENMARK ADOPTS SALES TAX

WASHINGTON, March 25—All passenger cars sold in Denmark will be subject in the future to a graduated sales tax of 15 to 30 per cent of the value, the Department of Commerce has been advised by Commercial Attache H. Sorensen, at Copenhagen. The sales tax became effective Feb. 1, and will be in force until Jan. 31, 1925. The sales tax does not supersede the horsepower tax but is in addition to it.

Rim Maker Charged with Fixing Prices

**Firestone Steel Products Co.
Denies Federal Trade Com-
mission's Allegations**

WASHINGTON, March 24—Charges of unfair trade practices and competitive methods in the distribution of its products have been preferred by the Federal Trade Commission against the Firestone Steel Products Co. of Akron, Ohio, automobile wheel rim and parts manufacturers, and the following distributors:

Jacob Mattern & Sons, Inc., New York City; Motor Rim Manufacturers Co., Cleveland; Motor Rim & Wheel Manufacturing Co., Chicago; Keaton Tire & Rubber Co., San Francisco; Standard Tire & Rubber Co., Boston; Phineas Jones & Co., Newark; Easton Wheel & Rim Co., Philadelphia, and H. O. Norris, Baltimore, trading as R. W. Norris & Sons Co.

The Commission alleges that the defendants allotted each of its distributors an exclusive territory privilege and entered into contracts with them which required the enforcement of a system of fixed retail prices and trade discounts used in connection with the restrictive and exclusive territorial agreements.

It is further alleged that in the enforcement of these agreements "the manufacturers distributed their schedule of retail prices with the trade in catalogs and price lists, and urging and securing the maintenance of them by retail dealers; coercing dealers through threats of the loss of their business to adhere and to enforce such system; and by withdrawing their business from the hands of dealers who refuse to abide by and enforce the defendants' price plan."

Company Makes Denial

AKRON, March 25—The legal department of the Firestone Tire & Rubber Co., in discussing the citation of the Firestone Steel Products Co., its subsidiary, on charges of "combining to maintain and enhance prices and to suppress competition in the sale and distribution of its products," states that at the end of the time given by the Federal Trade Commission for filing its answer it will be able to show that there has been no violation of the law by the company or its distributors.

"We deny any violation of the laws in distributing and selling our product and will satisfy the Commission that this is the case," the legal department stated.

Officials of the company, in commenting unofficially upon the case, pointed out that the Firestone Tire & Rubber Co. has been one of the prime movers in reducing prices of tires and called attention to the fact as showing the spirit of the company's operations.

BROTHERTON NAME CHANGED

DETROIT, March 26—The name of the Brotherton Co., advertising agency, has

been changed to McKinney, Marsh & Cushing. The officers of the company are: W. H. Marsh, president; W. A. Banks, vice-president; George W. Cushing, secretary, and F. F. McKinney, treasurer, all of whom were members of the firm under the original name of the Brotherton Co.

FINANCIAL NOTES

General Motors Acceptance Corp. announces that it has completed arrangements for the sale of an additional 14,000 shares of its capital stock to the General Motors Corp. at \$125 a share, thus acquiring an additional \$1,750,000 of capital funds. With this increase the General Motors Acceptance Corp. now has capital, surplus and undivided profits aggregating \$12,800,000. All of the stock is owned by the General Motors Corp.

Michigan Securities Commission has accepted the following applications: Detroit Testing Laboratories, \$10,000 first mortgage 6 per cent gold bonds; Guy Disc Valve Motor Corp., Ypsilanti, \$50,000 common stock; Jackson Motor Shaft Corp., Jackson, \$100,000 first mortgage ten-year 7 per cent sinking fund gold bonds; Oak Tire & Rubber Manufacturing Co., Burr Oak, \$36,000 common stock.

Dillon, Read & Co. of New York announces that \$750,000 principal amount of the first mortgage twenty-year 8 per cent sinking fund gold bonds of the Goodyear Tire & Rubber Co. have been designated by lot for redemption, May 1.

Sterling Tire Corp. of Rutherford, N. J., has authorized and issued \$400,000 ten-year 6 per cent mortgage bonds, which have been fully subscribed. The quick asset position of the company is said to be five to one.

Firestone Tire & Rubber Co. has declared the regular quarterly dividend of 1½ per cent on the 6 per cent preferred stock, payable April 15 to stockholders of record April 1.

McQuay-Norris Manufacturing Co. has declared its regular dividend, the action being taken at the meeting of the directors, March 15.

Part of Milburn Factory Bought by Grob Plating

TOLEDO, March 26—The Grob Plating Co., recently incorporated, has purchased of the General Motors Corp. a part of the old Milburn Wagon Works plant here and will expand its enamel and plating business immediately. William C. Grob is president and general manager.

The purchase gives the company a three-story brick plant, with 125 feet on Monroe Street and 462 feet along the Michigan Central tracks, with a loading dock extending most of the distance. One hundred and twenty men will be employed, and work will start at once on a twenty-four hour a day schedule. The company's business is mostly with the automotive industry.

The Martin-Parry Corp., which occupies a portion of the plant with its local assembly plant, will be permitted to remain until the Grob company needs more room.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

The outstanding development in the business situation last week was the sudden decline of money rates to the lowest figures reached in several years. Commodity prices showed general weakness, cash cotton reaching a new low for the year, and May wheat at Chicago declining to the lowest figure for the 1923 crop.

Some slight declines are noted in the operating schedules of steel mills since the early part of the month, when the rate of output was estimated at about 49,000,000 tons a year, equal to the highest rate of the past. The official report of the American Iron and Steel Institute on pig iron production in 1923 shows a total output of 40,361,146 gross tons, establishing a new high record and comparing with the previous record of 39,434,797 tons in 1916.

The production of crude petroleum in the week ended March 15 average 1,911,750 barrels a day, against 1,916,450 in the preceding week and 1,807,150 a year ago. All the fields showed declines, with the exception of North Texas and Wyoming and Montana.

Fisher's index of wholesale commodity prices stood at 149.2 last week, as against 150.7 in the preceding week and 167 a year ago. The current figure marks the sixth consecutive decline from the year's high in the week of Feb. 9.

Discounts Decrease

Discounts by Federal Reserve banks declined \$52,100,000 during the week ended March 19, most of the decrease being in bills secured by Government obligations. Bills bought in the open market declined \$48,400,000, while holdings of Government obligations increased \$84,300,000. Total deposits declined \$6,700,000, due to a net withdrawal of \$45,400,000 in Government deposits, while members' reserves increased \$36,300,000. The circulation of Federal Reserve notes declined \$20,700,000 and total reserves \$2,600,000, while the reserve ratio rose from 80.3 to 80.8 per cent.

Loans of reporting member banks increased \$63,000,000 during the week ended March 12, the gain being about equally divided between loans secured by stocks and bonds and "all other" loans. Investments increased \$22,000,000.

Call loan rates declined last week to 2½ per cent, the lowest figure recorded in more than four years. Time money rates also showed a marked decline, being quoted on Friday at 4 to 4½ per cent, according to maturity.

TRAILER MAKERS' ELECTION

DETROIT, March 26—Harvey C. Fruehauf has been elected president of the Trailer Manufacturers' Association of America. The meeting which elected him also voted to undertake a campaign for the amendment of the revenue law now in the Senate, whereby trailers would be exempt from the automobile excise tax.

Spring Buying Waits on State of Weather

No Indications Given That This
Season Will Fall Below That
of Last Year

NEW YORK, March 24—The automotive industry is well set for the ushering in of the heavy buying movement anticipated at this season of the year, the beginning of the movement depending largely upon weather conditions. There is no indication now that buying of automobiles this year will fall below that of last. To the contrary, all signs point to an increased sales volume as soon as the movement gets under way. Attendance at shows has been unusually good and other evidence has been given of a well sustained interest in cars on the part of the public.

Car producers, now operating on high programs, probably will not increase present schedules until spring buying starts in earnest and they are able to gage accurately the extent to which output can be absorbed. The possibility that March production totals may not measure up to those of previous months witnesses the conservative policies to which car makers have committed themselves and the general desire to let actual sales conditions govern factory operations.

High Programs Have Ruled

For the last twelve months the industry as a whole has been operating on high programs. The large schedules of recent months have been adopted not only to meet current demand, which has been above normal, but to guard against a shortage when the market reached its highest point of activity this spring. Producers have endeavored to prevent the condition of a year ago when there were not enough cars to go around during the season when prospective buyers flooded the market.

In no month of the last twelve has production fallen below the 300,000 mark. Output in January of this year was nearly as good as that in July and September of 1923, and February ranked with some of the best production months of last year.

A wholesome tone continues to be given to truck operations. Plants are actively engaged in turning out chassis and bodies for motor trucks as well as for motor buses and rail cars. The demand for buses is strong, coming from rural and industrial centers. Farmer demand for trucks has shown some slight improvement but will not

reach definite proportions until spring buying starts. There is every reason to believe that the farm market will absorb a much larger part of the output than it did last year though not reaching the point that under better agricultural conditions would be possible.

Parts makers have enjoyed an excellent season and are reporting operations at a good mark.

INDUSTRIAL NOTES

Heim Grinder Co., recently organized, has acquired the entire interest of the Ball & Roller Bearing Co. in the Heim centerless grinder and will continue the manufacture of the device at the present plant in Danbury, Conn. The officers of the company are: Henry N. Flynt, president; Clayton O. Smith, vice-president, and Ferris M. Angevin, secretary and treasurer.

Federal Pressed Steel Co. of Milwaukee, manufacturer of pressed, welded and seamless steel products, and automobile bumpers has consummated a deal with the Agate Auto Appliance, Inc. of Chicago, whereby it will merchandise the Agate stop signal in connection with Federal bumpers through its jobbing division, 360 North Michigan Boulevard, Chicago.

L. P. Halladay Manufacturing Co., which specializes in auto accessory specialties, has taken over a portion of the old Pan-American Motors Corp. buildings in Decatur, Ill. The Halladay company for some time has considered separation of its shock absorbers and bumpers from the remainder of the plant and its Pan-American location is destined to play that role.

United States Chain & Forging Co., maker of McKay tire chains, will erect an addition to its present plant in York, Pa., ground for which will be broken in the next thirty days.

Companies Drop Highway Billboard Advertising

NEW YORK, March 26—Cooperating with various civic organizations and women's clubs, the Standard Oil Co. of New York announces that it will abandon all highway billboards where they are objectionable or mar scenic effect. The company will confine its outdoor advertising to boards at garages and service stations. It also will assist in this highway reform by having its architects prepare plans for model refreshment booths along traffic routes, which will be inexpensive and in keeping with the surroundings, which will be furnished free to any concessionaire upon application.

Following this announcement, Mrs. W. L. Lawton, chairman of the National Committee for Restriction of Outdoor Advertising, gave out a list of fourteen other large national advertisers, which, she said, have pledged themselves to abolish highway billboards. Among them, Mrs. Lawton states, are the Kelly-Springfield Tire Co., B. F. Goodrich Co., Sun Oil Co., Champion Spark Plug Co., Hood Rubber Co., Ajax Rubber Co. and Dodge Brothers.

METAL MARKETS

Shading of sheet prices on other than full-finished automobile grades has become the rule rather than the exception. Quoted steel bar prices are subject to price-trimming to the extent of about \$1 per ton. When specifications are in the least attractive, cold-rolled strip steel can be purchased at 4.75c base—\$5 per ton below what is still nominally quoted as the market. For hot-rolled strip the price named is still 3 cents base, but buyers have little trouble in securing a 2.90c quotation. Should these conditions lead one to believe, however, that competition has waxed so keen that mills are willing to sacrifice price in order to wrest business away from one another, it will be quickly found that the concessions cited are the irreducible minimum or maximum.

With the exception of the leading market interest and a very few independents in unusual position, these concessions have become general. Attempts by consumers to widen these concessions meet with sharp resistance on the part of producers who are apparently of the opinion that further price shading would not result in more business. For this reason the market presents the anomaly of being steady at these concessions. Blast furnace interests point to the firmness of semi-finished steel as a prop for pig iron values. Semi-finished steel prices, especially those for sheet bars, seem, however, to be more artificially pegged than naturally firm. There is little interdependence between pig iron and steel prices. Time and again the former have soared and the latter lagged, and vice versa.

A somewhat more potent argument adduced by the pig iron producers why prices for their product should not decline further, is that in all probability iron ore prices which, it had been expected, would be revised downward to the extent of 50 cents per ton, will be permitted to remain unchanged when 1924 prices are named by the iron ore producing interests within the next few days. Alloy steel makers appear to have a fair volume of automotive business in hand, and continue to make regular shipments on account of previously concluded contracts. In other quarters of the market complaints of a considerable slowing up in automotive buying are heard.

Pig Iron.—The market for foundry and malleable irons continues quiet and easy at unaltered prices, automotive foundries in the main confining their purchases to single car orders.

Aluminum.—Arrivals on a relatively generous scale continue from abroad of ingots as well as sheets and other forms of rolled and drawn aluminum, all presumably earmarked for liquidation of contracts in force. Whether third-quarter business has been placed to any extent is not known. There are three classes of aluminum consumers. The first are those who depend for their supplies on the sole domestic producer. Their arrangement protects them against abrupt price changes and insures them regular deliveries. The second are those who buy through the large importers, and they are similarly protected. Third come the consumers who must look to the so-called "outside" market for their supply. The vagaries of the latter can not be anticipated.

Copper.—Market sentiment changes frequently these days, but there is little doubt that foreign production, especially that of Africa is growing by leaps and bounds and that the influence of this condition on prices is a factor not to be overlooked.

Calendar

SHOWS

- Jan. 3-10—New York, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Bronx Armory.
- Jan. 24-31—Chicago, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

- April 2-13—Barcelona, Automobile Exposition, under the auspices of the Confederacion de Camaras Sindicales Espanolas del Automovillismo y Ciclellismo, Palacio de Arte Moderno.
- April 6-27—Rosario, Argentina, under the auspices of the Automovil Club Argentino.
- April 8-22—Milan, Annual Automobile Show, Sports Palace.
- April 16-21—Johannesburg, South Africa, Witwatersrand Motor and Agricultural Show.
- May 10-20—Madrid, Annual Automobile Show, under the auspices of the Nation-

- al Association of Automobile Importers, Palacio del Helo y del Automovil.
- Aug. 23-Sept. 6—Toronto, Ont., National Automobile Show in conjunction with the Canadian National Exhibition under the sanction of the Canadian Automotive Equipment Association and the Automotive Industries of Canada.
- Oct. 2-12—Paris, passenger cars, motor cycles, bicycles and accessories, Grand Palais.
- Oct. 17-25—London, Annual Passenger Car Show, Olympia.
- Oct. 22-31—Paris, motor trucks, stationary engines, garage tools and machine tools, Grand Palais.

RACES

- April 24—Fresno.
- April 27—Trapani, Italy, International Automobile Race.
- May 30—Indianapolis.
- June 14—Altoona.
- July 4—Kansas City.
- Aug. 3—Lyons, France, European Grand Prix.
- Sept. 1—Altoona.

- Sept. 1—Syracuse.
- Oct. 4—Fresno.
- Oct. 19—Kansas City.
- Nov. 24—Los Angeles.

CONVENTIONS

- March 31-April 4—New Orleans, Annual Spring Meeting of the Automotive Equipment Association.
- May 19-22—Detroit, National Automotive Service Convention and Maintenance Equipment Show, under the auspices of the Service Division of the National Automobile Chamber of Commerce, General Motors Building.
- May 21-24—Detroit, International Motor Transport Congress under the auspices of the National Automobile Chamber of Commerce.
- June 3-4—Detroit, Midsummer Meeting of the Automobile Body Builders Association, Hotel Statler.
- June — Washington, Pan American Highway Congress, under the auspices of the Pan American Highway Mission.

- Sept. 22-26—Boston, Sixth Convention and International Steel Exposition of the American Society for Steel Treating.

S. A. E. MEETINGS

- April 2—Milwaukee Section, The Future Passenger Car, C. W. Pendock, chief engineer, Le Roi Co.
- April 3—Detroit Section, Chassis Lubrication, F. H. Gleason, General Motors Building, Detroit, 8 p. m. Dinner, 6.30 p. m.
- April 17—Metropolitan Section, Fleet Maintenance, F. Winchester.
- May 15—Metropolitan Section, What Roads and Steels Do to Automobiles.
- June 24-27—Summer Meeting of the S. A. E., Spring Lake, N. J.
- Oct. 21-24—S. A. E. Production Meeting, Detroit.
- Nov. 18-19—Joint Service Meeting of the S. A. E. with the N. A. C. C. Cleveland.
- Aeronautical Meeting at Dayton at the time of the Pulitzer Races.
- January—S. A. E. Annual Meeting, Detroit.

Supply Trade Gains in Western Canada

CHICAGO, March 25—The automotive supply business in British Columbia, Alberta, Saskatchewan and western Canada generally is far better just now than in the corresponding period of any previous year, according to reports received by Commissioner William M. Webster of the Automotive Equipment Association.

Mr. Webster's survey is based largely on observations made by Arthur R. Mogge, merchandising director of the association, who recently visited Vancouver, Calgary, Regina, Saskatoon, and other important points in the Canadian industry. Automotive jobbers in these various cities reported to Mr. Mogge that the wholesale business for January and February was much ahead of the same two months in 1923, one jobber announcing an increase of more than 200 per cent.

"Good business in western Canada," said Mr. Webster, "can be attributed directly to the mild winter and to the fact that the jobbers are doing a nice business in replacement parts and radio, as well as in accessories and garage equipment."

Syrian Dealers Promote Development of Highways

BEIRUT, SYRIA, March 10 (*by mail*)—The promotion of highway building is one of the major activities of the Syrian Automobile Dealers Association (Association des Importeurs d'Automobiles), which was formed here in May of last year among the leading companies handling motor cars and allied lines.

It is now working on a plan that will lead, it is hoped, to the construction of

concrete roads in some sections of the territory, with less expensive types in districts where traffic is lighter.

In addition to these activities, a commercial service is being developed. The association, now entering its second year, has not only enlarged its membership but also has broadened cooperative work among its members and the producing companies from which are imported the automobiles and equipment used.

J. Audi of the firm of S. Audi Freres heads the association as president, following the annual election early this year. R. Day of the African & Eastern Trade Corp., Ltd., is vice-president, with E. Saad of Ibrahim Saad & Fils, treasurer, and F. Kettaneh of the Eastern Motors Co., secretary. The executive committee, in addition to the officers, are C. Corm of the Société Generale et Industrielle, and F. Khairallah of the Syria Auto & Electric Co.

Tire and Wheel Imports Restricted by Nigeria

WASHINGTON, March 24.—The importation into Nigeria, British West Africa, of motor vehicles fitted with wheels adapted for solid or double tires is prohibited by an order, effective at once, issued by the government of that country.

The United States Department of Commerce's tariff division, has also been advised that the importation into Nigeria of solid tires and double tires, whether solid or pneumatic, for motor vehicles, and motor vehicle wheels adapted for solid or double tires, is also prohibited, except under license from the comptroller of customs.

No reason is assigned for the regulation.

French Taxes Based on Horsepower Alone

PARIS, March 15 (*by mail*)—Automobile taxes will be increased approximately 22 per cent by the financial law voted by the French Parliament. Instead of comprising automobiles in the general 20 per cent increase in existing taxes, an entirely new and simplified method of taxing, based on horsepower alone, has been evolved.

Under the provisions of this law, half taxes, to which all persons holding a "patente" or trading license were entitled, have been abolished, and taxes are the same whatever the use to which the automobile is put.

Under the old system only 17 per cent of French motorists paid full taxes, and these 17 per cent will pay less, while the remaining 83 per cent will be called upon to pay more.

A rather peculiar feature of the new law is that passenger cars and trucks with solid rubber tires pay the same amount, on a horsepower basis, while a reduction is made for trucks equipped with pneumatic tires. Beginning at 180 francs a year for passenger cars with a minimum of 5 hp., the tax increases to 1920 francs per annum for a car of 40 hp. and more.

ASK USED CAR DETAILS

Detroit, March 26—Letters asking for information on the Appleby Motormart plan of handling used cars have been received by Percy Chamberlain Associates, Inc., from dealers in Norway, New Zealand, England, Scotland, Honolulu and Denmark. These dealers say their problem is much the same as that faced by American dealers.